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RECENT DEVELOPMENTS IN RESEARCH METHOD AND PROCEDURE IN AGRICULTURAL ECONOMICS[1]

H. R. TOLLEY
BUREAU OF AGRICULTURAL ECONOMICS

The monograph on Research Method and Procedure in Agricultural Economics, published in 1928 by the Social Science Research Council, enumerates five scientific methods and describes the application of each to Agricultural Economics research.

The five methods are: (1) The Method of Analogy; (2) The Case Method; (3) The Informal Statistical Method; (4) The Statistical Method; and, (5) The Experimental Method.

Accepting this classification for methodology in our field, let us examine recent developments in each of these methods, and their application in the different branches of research in agricultural economics. In deciding on what developments to catalog as *recent,* let us depart from the criterion accepted by those who planned and wrote the two volumes on "Recent Economic Changes" which appeared last summer and instead of including all post-war developments, let us be modernists and begin with, say, 1924 or 1925.

None of the five methods is a recent development, according to this criterion, nor would it be if we should accept developments of the past quarter or half a century as recent. But there have been some developments of technic within

[1] Paper read at the 20th annual meeting of the American Farm Economic Association at Washington, D.C., December 30, 1929.

the different methods. And there have been significant developments in the application of the different methods to research in the field of agricultural economics.

The Method of Analogy. Examining the different methods for developments in technic, we find that the primitive method of analogy, while rather widely used—and rightly so—is such a simple method that the workers in the field all accept it as a *finished* method and no one is endeavoring to develop its technic.

The Case Method. Turning to the case method, we find a strikingly different situation. In recent years there has been much talk about how to make case studies and the possible usefulness of the case method in our field. Discussions of the case method often reveal that the discussors are confused as to what is meant by the case method and that they have not clearly differentiated between the case method and the method of analogy, or the statistical method, or the experimental method. The technic of case studies in the field of agricultural economics has not passed far beyond the discussion stages. Most of the developments in this method are still to come.

Informal Statistical Method. The third method, the informal statistical, has received little attention from agricultural economists in recent years. As defined by Professor L. L. Bernard, the sociologist, "the informal statistical method involves the rough generalization which is made by approximation from facts, possibly poorly defined and attested, which are picked up in more or less random observation. The only distinction between informal and formal statistics is that the former is merely more or less accurate approximation, usually of a fairly simple sort, while the latter is a process of complex calculation of general principles and processes, of averages and means, on an exact mathematical basis."

In much of the earlier work in practically all parts of the field of agricultural economics the informal statistical method was used, and it is still being used by many workers, but recent developments have been and doubtless will continue to be away from the informal to the formal statistical method.

Statistical Method. The important place now occupied by statistical method in the field of agricultural economics research is reflected in the aforementioned publication, "Research Method and Procedure in Agricultural Economics," in which more than 250 pages are devoted to it, as contrasted with 25 pages for all of the other methods together.

There has been more recent development of the technic of formal statistical method as applied in our field than of any of the other methods. The most striking developments have been in the technic of analysis of statistical data. Methods of multiple correlation analysis have been developed and put into general use throughout the country. Mechanical aids and short-cut methods are constantly appearing. A practical technic for determining multiple curvilinear correlations was first developed by Mr. Ezekiel about five years ago, and in the latest number of the *Journal of the American Statistical Association* there appears an article by Mr. Bean describing a simplified technic for determining curvilinear correlations which he has developed within the past year. There has been encouraging progress in the development of measures of the reliability of results from sample data and their application to economic data pertaining to agriculture. But, after all, these recent developments are only minor additions and modifications. *Statistical method* is older than agricultural economics.

The Experimental Method. The situation with regard to the experimental method is similar to that of the case method. There seems to be much confusion in the minds of agricultural economic workers as to what the experimental method in economic research implies. The luncheon session of last year's meeting of the association was devoted to a discussion of the experimental method. The discussions there, as well as thirty statements supplied by the economics departments of as many experiment stations in 1928 for use in the preparation of the section on Experimental Method, in Research Method and Procedure in Agricultural Economics, showed that, while most agricultural economists believe that this method has a place in research in our field, they are not at all sure just what that place is, nor are they all agreed as to just what is experimental method in agricul-

tural economics research. As with the case method, formulation and developments in the technic of the experimental method as applied to our field are still to come. It is to be hoped that in the near future both these methods will be more clearly defined, and the technic developed, and that they will be used much more widely than at present in many parts of the field of agricultural economics.

Many classifications of method, other than the one discussed here, might be made. For instance, some workers refer to the accounting method, others to the geographical method. Still others make a classification on the basis of inductive and deductive methods. But whatever the classification, it will be found that all methods are included in or closely related to the five first mentioned. Further, it will be found that recent developments—in the sense used in this paper—have not been very marked.

Research Procedure

However, if we broaden the scope of our discussion to include the *procedure* in conducting research projects, we find many noteworthy recent developments. The remainder of this paper is devoted to a discussion of recent developments in procedure and in the application of already-developed methods.

Under a grant of funds from the Social Science Research Council, there is now under way a project on method and procedure in each of 15 subfields in agricultural economics. The aim is to outline the scope of each subfield, to describe and appraise the methods being used and the procedure being followed, and to point the way for further developments. Recent developments in each field will receive special attention. The project is under the supervision of the Council's Advisory Committee on Social and Economic Research in Agriculture. Dr. John D. Black is the director of the project and he has the assistance of the leading research workers in each of the subfields to be covered. If that subject were completed this would be a much better paper.

The results of a reconnaissance made with the help of the research workers of the Bureau of Agricultural Economics follow.

Farm Management Research

Let me mention first recent developments in farm organization and farm management research, and begin with type-of-farming studies. Dr. Spillman did much pioneer work on these studies, using the results of the 1920 census of agriculture. Recent developments include a procedure for determining and portraying type-of-farming areas, the typical farming system or systems in each area, and the historical changes which have occurred. The procedure is based largely on the use of census data, and if we can be content with a quinquennial portrayal of changes, it gives practically as complete and satisfactory results as could be obtained from data collected specifically for these studies. A considerable number of States, in which soil and climatic conditions are fairly homogeneous, have brought to a successful conclusion projects of this type. A procedure suitable for States or areas where there are wide variations in soil and climatic conditions is yet to be developed.

Another phase of type-of-farming studies attempts to determine the comparative advantage of the existing types over other types that might have developed in an area. This phase of a type-of-farming study would, no doubt, often result in the conclusion that some type or types, other than those actually found in an area, would be more profitable and of higher comparative advantage. The best study along this line that has been published to date is reported in Iowa Bulletin 259.

Another phase of type-of-farming studies involves determining *why* type-of-farming areas shift and *why* the systems of farming within an area change. Procedure for this phase is still in the developmental stage.

Closely related to this phase of type-of-farming studies are the so-called elasticity of supply studies that have as their object measuring the group-response of farmers in their production and marketing programs to changes in prices and other factors. It has long been recognized that there is a fairly close relationship between changes in price and subsequent changes in supply of agricultural products coming from a particular area or region or country, but attempts to obtain quantitative measures of this relationship

are a recent development in agricultural economics. Already a number of worthwhile studies have been made, some designed to show the relationship between the price and the supply of a product for the country as a whole, others dealing with a single area or region. In all of these studies the statistical method—principally multiple curvilinear correlation—has been used. That is, an accepted method has been applied in a newly developed line of research. The most serious handicap in these studies is the lack of adequate data. Available data on acreages of crops and numbers of livestock by small geographical units are scanty and often unreliable. Studies to date have dealt almost entirely with acreages and numbers of livestock. A procedure for measuring the relationship between changes in prices and changes in intensity of cultivation and feeding has not yet been worked out.

Turning to the studies designed to show most profitable systems of farming and methods of production we find a noteworthy recent development—in this country at least—in the rather general adoption of the budgeting method of approach to the problem. Dr. Holmes has called this the Method of Estimation; Dr. Black has called it the Method of Substitution. While this is a recent development in the United States the budgeting or "advance-estimate" method of approach has been used for a century or more in Germany. Dr. Walter J. Roth, who spent last year in Europe studying methods of procedure in farm management research there, says there is practically a unanimity of feeling on the part of German farm-management workers as to the importance of the advance budgeting of probable earnings.

In the budget approach it is necessary to study the results to be expected from the numerous possible combinations of enterprises and resources of a farm in the light of changing price relationships and in the light of the physical conditions under which production takes place as well as in the light of the managerial capacity of the operator and the practices he uses.

In some research studies made to date too little attention has been given to the question of which of the many factors

of production is most limited and around which the organization might most profitably be built. Most of the budgeting studies have been made on the basis of an "average" curve of output per unit of input (the so-called average unit requirements). Obviously, refined results can not be obtained with such data. As input-output data become more complete and show more definitely what particular outputs follow from given sets of input factors, farm budgeting results will improve. There have been some significant recent developments in the procedure of determining input-output relationships and it is to be hoped that developments will continue until generally applicable results are available.

Procedure for measuring the managerial capacity of the farm operator, and for determining the relation between his ability to cope with the problems of proprietorship and the most profitable system of farming for him, has not yet begun to take form.

Land Utilization Research

The definition of the scope of land utilization research and its relation to other parts of the field of agricultural economics and to fields other than agricultural economics is a *recent development.* Land utilization is now defined as "that branch of land economics which comprises the study of the land resources of a nation or other geographic unit with a view to determining for what and how they may be most economically employed." Most of the land utilization studies undertaken to date have been confined to marginal or submarginal areas already occupied by farmers, where incomes and the plane of living are low, where extensive tax delinquency, farm abandonment or deterioration of the land through soil depletion and erosion, and similar factors—separately or in combination—indicate serious problems of land utilization. The *methods* used in these studies can be classified as adaptations of the statistical, informal statistical, and case methods. The *procedure* is characterized by the working together of land economists, farm economists, forest economists, and, sometimes, tax economists, sociologists, and others. The farm and land economists endeavor to obtain the information needed to gain a comprehensive

understanding of the agricultural possibilities of the regions. The forest economist attempts to obtain the information requisite for formulating a forestry program for the non-agricultural land. All workers together attempt to formulate a sound land-utilization program for the locality, area, or region under study. Studies that have been made or are now under way in many States—notably New York, Wisconsin, West Virginia, Kentucky, Pennsylvania, and Vermont—are proving of practical value as a basis for differentiating between agricultural and non-agricultural land, for developing State and National forest policies, for formulating agricultural extension programs, and school and road improvement programs.

Procedure in the studies can be described just now as being in a "state of evolution." Experience gained from studies now under way may be expected to result in further evolutionary changes in types of data obtained, the technique of collection and analysis, and in the presentation of results. In at least one project, now being formulated, the introduction of aerial photography and mapping as one of the principal methods of collecting data is being seriously considered.

Farm Taxation

Should one go back five years in farm taxation research, he would be almost at the beginning. The tendency now is toward intensive studies in selected areas and toward emphasis on expenditures in communities where public functions are financed primarily by revenue derived from taxes on farm property.

In the early stages—five years ago—emphasis was placed on measuring the trend of taxes in relation to property values and to income in agriculture. Also a number of studies were made of the valuation of farm property for taxation, revealing important inequalities in the valuation of property. It is probable that additional studies in the other parts of the country would yield similar results. Data obtained on taxes in relation to net income from various parts of the country also indicate a general similarity.

A few projects are under way now, emphasizing problems of expenditures. In these studies of expenditures there ap-

pear to be two main objectives, first, to ascertain to what extent it may be possible to secure greater economy in the expenditure of public funds by improved organization and administration of local government units; and, second, to study the relation of benefits derived from governmental services and improvements to tax burdens on various groups. In one experiment station an effort is being made to estimate the benefits which farmers derive from their tax money.

More and more it is being realized that the farmer's tax problems are closely connected with taxation and public expenditures in general. In addition to obtaining data on expenditures and tax levies, it is necessary to go beyond statistical material and to apply to the problem a great deal of hard thinking with respect to the economic consequences of the prevailing system of taxing farm property. For instance, the effect of property taxes on land utilization is coming to the front as a major problem.

We hope research in this field will continue to develop away from routine procedure that can result only in the conclusion that farm taxes are high, toward a procedure that will bring out facts, and will point to conclusions, that will help in promoting a more effective utilization of revenues and in devising tax systems that will be equitable to farmers as well as to those in other occupations.

Agricultural Credit

Research in short-term agricultural credit has sought to ascertain the relation of credit management, credit standing, and, farm practice to credit costs and requirements on individual farms in selected areas. In these studies the credit problems have been approached from the side of individual farmers whose risks, management, and credit standing are thought to have an immediate bearing on the availability and cost of credit. Aside from these studies, research in the field of agricultural credit in recent years has been devoted largely to descriptive studies that endeavor to outline the available credit facilities, and show the extent to which they were utilized and the basis on which credit accommodations were secured. Projects of this na-

ture are of material value only in so far as they serve as the basis for more detailed analysis of particular problems revealed in such surveys.

It is essential that we should have a better understanding of the chief source of production credit—the country bank. Inasmuch as the farming industry, except at seasonal periods and in particular areas, largely finances its own production requirements, it is essential that we should have a more definite knowledge of the flow of funds between particular agricultural communities and other areas. If this relationship can be delineated clearly it should be possible to indicate how farming practices and the available credit supply are inter-connected. In many areas credit facilities in themselves could be improved through minor changes in farm organization. A very worth while approach to the country bank problem has been initiated in the States of Iowa and Arkansas where analyses of policies of individual banks have been undertaken. The expansion of this work in other areas and its correlation with the production programs of those particular areas should be encouraged. In its wider aspects, changes in production of specific farm crops as influenced by either increases or decreases in the normal supply of production credit available to producers, is a problem that should merit careful consideration.

Research has not yet indicated with any definiteness the extent to which it is practicable for farmers to band together under cooperative organizations and consolidate their requirements for production credit. A study in this field is now in progress dealing with credit corporations affiliated with the cooperative marketing associations of the Cotton Belt. It would be of value if studies could be undertaken which would indicate the extent to which the minimization of risks and the reduction in the cost of distributing and supervising such credit accommodations effect actual saving to the farmer borrower. The risk and other costs of distributing credit through the cooperative organization are the crucial points of the entire program.

In the field of mortgage indebtedness more emphasis is being placed upon the official records for securing basic data. In some projects under way or contemplated it is anticipated that valuable information can be secured through the utiliza-

tion of the annual reports of life insurance companies submitted to the various State insurance officials. The problem of foreclosures in relation to mortgage indebtedness is still a very important problem and emphasizes the importance of arriving at a sound basis upon which appraisals of farm land may be conducted. Regional studies of this character, utilizing crop income data and the records of farm sales, together with information as to taxation and interest rates, offer a profitable field of analysis.

Agricultural Incomes

Establishment of annual estimates of gross income and cash income from sales in the several States stands out as the major recent development of research in agricultural incomes. Within the past year the Bureau of Agricultural Economics has completed estimates of gross income and cash income from each of the commodities for each of the States for each of the five years, 1924-1928, on a basis that can be carried as routine work.

Method and theory are simple and straightforward—find out what was produced, how much of it was sold, and what prices were obtained for what was sold. State totals are aggregates of the estimates for the commodities. But there the simplicity ends—the devices employed to reflect the facts are many and complicated. The Bureau's estimates incorporate results of intensive work of specialists over a long period which, in large part, are not yet made available in formal publications.

If the figures leave something to be desired in the way of ultimate accuracy, the deficiency is attributable largely to lack of adequate information. But inquiries instituted years ago are now beginning to yield results that can be used in improving the estimates. Additional inquiries must be made as time and means permit.

A satisfactory procedure for collecting and compiling information that will form a satisfactory basis for estimating the expenses of farming in each State has not yet been developed. Estimates of *net* income from agricultural production must wait until the procedure is perfected and much additional information collected.

There is real need for continuation of intensive work in agricultural incomes—much hard work must be done on filling the gaps in the data now available and in finding the keys to interpretation of data now perhaps insufficiently understood. The Bureau feels great need of assistance in verifying or revising the State income figures recently published. Cooperative effort is needed now just as much as it was before the Bureau's estimates appeared.

Often there are wide variations in income between different parts of the same State or between different types of farming. These variations point to the need for income data in considerably more detail than that afforded by State estimates. Developments of procedure for providing income estimates or indexes on a county basis or on a type-of-farming-area basis are to be expected. The economists at several of the State colleges are now working (and have been working for some time), on this phase of the income problem.

Estimating and Forecasting Production

Real progress has been made during the last five years in the technic of forecasting and estimating crop and livestock production. The application of statistical methods in this field has resulted in changes in procedure which have already greatly increased the reliability of the estimates and forecasts. Time-honored methods and procedure have been subjected to searching critical analysis. In those lines of work in which established technic was found to be satisfactory it has been retained, and in so far as possible it has been improved and supplemented. In those lines in which the methods in use were found to be inadequate new technic is being devised to meet the situation. Improvements have been along several distinct lines as follows:

(1) Subjective methods of sampling have been replaced by objective methods in connection with estimating changes in acreage and numbers of livestock on farms, cotton boll counts, etc.

(2) The principle of stratification of the sample is being applied comprehensively and specifically.

(3) The reported condition or appearance of the growing crop in percentage of normal is now being interpreted in

terms of probable yield per acre by means of correlation technic rather than by the less satisfactory "par" method.

(4) Weather and economic factors are also being used as a basis of forecasting crop yields per acre and acreage, especially in the case of those crops where the reported condition has not been a trustworthy indicator of forthcoming yields.

(5) Data of better quality are being obtained in increasing volume: The ginnings of cotton are reported directly by the ginners at intervals during the growing season; carlot shipments of livestock, grain, fruits and vegetables are obtained as well as the market receipts of livestock, slaughter of livestock under Federal inspection; sales of tobacco and the quantity of several crops canned or packed for human consumption are obtained. These data are used currently as a basis for estimating production of crops and livestock and historically as a means of checking the reliability of the estimates.

From the founding of the Department of Agriculture in 1862 until within the past decade practically all estimates were based primarily on subjective sample data obtained from voluntary, unpaid crop correspondents. Satisfactory sample data are obtained by this subjective method of sampling only when the crop reporter himself is able to form a fairly definite concept concerning the object of inquiry. Farm prices, wages, conditions or appearance of the growing crop, crop yields per acre, weight per bushel, and quality of product, are usually sufficiently well known to the crop reporter to enable him to make a reasonably satisfactory estimate for his own locality; whereas his knowledge concerning changes from the previous year in acreages of various crops or numbers of livestock does not extend much beyond his own farm, and consequently his estimate for the locality is of doubtful value without special means of interpretation which have not been always available.

It is necessary, therefore, to obtain sample data concerning acreage, numbers of livestock, etc., for the crop reporters' own farms. Although this sample of individual farms was first used in the eighties as a rough check on the sample of crop reporters' judgments for his locality, only

during the past decade has it been systematically developed and actually utilized as a basis for estimating the changes from year to year in acreage and numbers of livestock. This type of sample data was first obtained from the regular crop correspondents and in 1924 was expanded to include a much larger number of farms obtained by the aid of rural mail carriers. This expansion also resulted in a sample much less selective than the one from the regular crop reporters, yet not fully representative of all farmers.

The development of the technic for satisfactorily handling this type of sample has brought the Division face to face with the limitations of any sample obtained from voluntary, unpaid reporters. A partial census of *all the farms* in representative agricultural areas, taken by well-paid skilled enumerators, is needed in order to eliminate the selective influence of a sample obtained only from those farmers who are willing to report either by mail or to the rural mail carrier. Such a partial census has been made successfully for several years in Alabama, where State funds have been specifically provided for the purpose. On the basis of a partial census of about 10 per cent of the farms in each county, highly reliable estimates have been made for the State as a whole, and reasonably satisfactory estimates by counties. This method of a partial census has been in use for 20 or 30 years in parts of northern Europe. The need for the partial census as a basis for reliable estimates of changes in acreages of crops and numbers of livestock and as a basis for estimates by counties cannot be overemphasized.

Recent studies show that in past years there has been considerable co-variation between the appearance of the growing crop, condition, and the final yield per acre with many crops in various States and areas. To the extent that this relationship exists it may be used as a basis of forecasting the yield. Weather conditions, even as early as planting time, also have shown significant relationships with yield per acre and are now being used either to supplement the indication for condition, or in place of condition in those instances in which condition does not appear to have been related to yields, as is the case with potato yields in most of the New England States and wheat yields in the Atlantic

Coast States. This type of research work is in its infancy, but has effected material improvement in the technic and accuracy of forecasting crop production during the past two or three years.

Price Research

Dr. Stine's and Mr. Working's papers (printed in the January JOURNAL) covered many recent developments and pointed out the need for further developments both in the collection of data for price research and in the methods of analysis and use of the results. Developments along two important lines were mentioned only incidentally by them. The first is the development of what may be called research in local prices as distinguished from central market prices, and the second is in the study of relation of quality to market prices.

Studies of the relation of local production and local supplies to local prices are beginning to yield promising results. Data for these studies, that is, local prices for a period of years, and local production and supply of the commodity under study, are usually not readily available and cannot be obtained by the procedure ordinarily used in collecting current data. A procedure has been developed in at least two States—Maryland and Virginia—which has made possible the compilation of satisfactory series of local prices and related data for a century or more from newspaper files, mercantile records, old account books, and farm diaries. Unless we expect to wait until procedure for collecting local price and production data currently is developed, and then wait many more years until series of usable length have accumulated, much work in compiling historical local data must be undertaken.

Studies of the quality as related to prices have recently been made or are under way now for a considerable number of products; for example, vegetables in the Boston market, spring wheat in Minneapolis, cotton at the primary cotton markets, potatoes in Maine and butter in New York City. Procedure, in general, has been (1) to work out measures for the quality factors of the commodity being studied, (2) to obtain first-hand records of the price and quality of particular lots and then to correlate the measures of quality with

prices to obtain the relationship between each quality factor and the price. Dr. Fred Waugh has been responsible for the development of much of the procedure used in these studies. He states that as a result of his studies he has come to believe that for perishable fruits and vegetables the market price variation due to differences in quality is often more important than the season-to-season variations due to differences in supply.

The results of these studies should be useful as guides to production and marketing methods and should be very helpful in establishing standard grades that will represent variations in quality corresponding with market price differentials.

Studies to date have dealt almost entirely with wholesale market prices. There is need for further development of these studies to show the relation between quality and retail prices and the relation between quality and farm prices.

Consumption and Demand

There have been a number of noteworthy recent developments in the technic of studies of consumer demand and there has been some development in studies of consumption. These latter studies are closely related to research in prices and in demand, but the emphasis is on factors affecting the consumption of a commodity or a series of commodities rather than on factors affecting prices or on factors affecting demand.

In consumer demand studies the trend of development has been away from the earlier procedure of interviewing consumers and obtaining answers to questions as to their consumption of a commodity, their preferences for competing commodities, their reasons for preferring a particular quality or grade or brand, and similar items. Recent studies are attempting to determine the shape or characteristics of the demand curve for a commodity at a specified time, how the demand curve shifts in position from one period of time to another and why, and finally, how different groups of consumers are related to the demand curve. The procedure in these studies involves the "consumer-survey" to a certain extent, but primary emphasis is placed on obtaining records

of the purchases of a commodity by a group of consumers over a period of time. These may be obtained from records kept by consumers cooperating with the investigators or by tracing deliveries to or sales from the marketing units serving a known group of consumers. Many intricate problems in both the collection and analysis of data must be solved before a satisfactory and generally applicable procedure is evolved. But this line of studies is of great importance in the further development of agricultural economics research, and much careful study and hard thinking on both objective and procedure is needed.

Marketing Research

I have not yet mentioned research in marketing, although, until recently, marketing and farm management were usually considered as the two divisions, between them including the entire field of agricultural economics. As a matter of fact, our Association last Friday afternoon was divided into two round-table groups, one labeled Marketing, the other Farm Management.

One of the outstanding recent developments in Marketing Research, it seems to me, has been the division of the field into a number of more or less clearly defined subfields. For instance, price research, and studies of consumption and demand, which I have just mentioned, would, not many years ago, have been classified as Marketing Research by most agricultural economists.

Another recent development has been the marked increase in emphasis put on research in cooperative marketing, in which particular attention has been paid to such things as factors affecting the growth and development of cooperative marketing, business analyses of individual cooperative associations, legal phases of cooperative marketing, and membership relations.

But even with all these recent developments is there not still a place in the field for Marketing Research? Is there not opportunity for productive research directed toward the economics of grading, transporting, storing, and processing agricultural products? Would it not be productive to analyze the economic, financial, and operating organization

and business practices and management of private marketing units as well as cooperative units? To round out the research in the field of agricultural economics should we not have projects designed to determine the most economical marketing and production program for a commodity in a given marketing area? It is to be hoped that one of the developments of the near future will be a "renaissance" in Marketing Research, and that projects will be developed dealing with these and many other related problems which have received little attention in recent years.

Discussion by G. W. Forster

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Mr. Tolley has presented a very excellent paper on "Recent Developments in Research Method and Procedure in Agricultural Economics." All of these methods are worthy of comment, but I wish to confine my remarks to the changes which have taken place in the research methods employed in the field of farm management.

The pioneer workers in the field of farm management may be designated as "factologists," as they emphasized the collection of "facts" and gave little time to theoretical analysis of problems involved. They not only insisted on having "facts" but they believed, or left the impression that they believed, that facts alone were sufficient to solve the problems of farm management. No objection, of course, can be raised to the desirability of having facts, but in retrospect, it is rather doubtful if all of the data collected by these pioneers can be so classified. The data were defective largely because of the method used and also to the fact that farmers, the chief source of the supply, are seldom in the position to give accurate information. The survey method was relied upon almost exclusively in collecting the facts. While much has been written in regard to the validity of the data so collected, it is now realized that the data collected by this method are in many instances inaccurate. This has been sufficiently demonstrated, I believe, in the report of the Advisory Committee on Social and Economic Research in Agriculture.

Whatever may be said in praise of the early workers, and much can be said, they were not trained statisticians, economists, or in any sense thorough-going accountants. As a result the methods that they used in analyzing the data were not only statistically faulty, but also naïve. One will seek in vain, I believe, in any of the early publications for a clear theoretical statement of the problem or a careful description and justification of the methods used. The major objective was to isolate the factors which did or were supposed to affect success, such as the size of the farm, amount of capital, hours of productive labor, distance to market, number of crop acres, percentage of the investment in real estate, investments in building per acre, number of animal units, receipts from

livestock, receipts from crops for each dollar received from livestock, and the reverse, crop yields, number of eggs per hen, ad infinitum.

These various factors were correlated with income, usually labor income, which was used as the measure of success. These various factors and labor income frequently showed a high degree of correlation. It was almost invariably found that as the magnitude or size of the independent variables increased the magnitude of the dependent variables also increased.

There are several obvious defects in this method. First, the pioneers were rather careless in the construction of their correlation tables. The size of the class interval generally lacked uniformity and hence the conclusions reached with respect to the action of the dependent variable were untrustworthy. Second, it was not always certain that the data possessed relevancy. That is, there was not unmistakable relation between the factors correlated. Third, logical consistency, a prerequisite of statistical validity, was not always adhered to. Fourth, the variables used were not always homogeneous and often comparisons were made between variables which were not in strict accuracy, comparable. Fifth, the method of analysis did not take account of the fact that quantitative data are usually affected by a great number of causes. They believed that the relation between one independent variable and the dependent variable was trustworthy—an assumption, which can be made only if all of the other factors affecting the independent variable are held constant or in some way their effects are "averaged out." Sixth, the measure of success—labor income—was itself defective, or at least open to serious question.

The conclusions reached and the suggestions offered for improvement of the organization and management of farms, clearly showed the lack of a comprehensive understanding of economic theory. As there was an apparent correlation between the various factors and labor income, it was suggested that success in farming depended on increasing the magnitude of these factors; that is, success would be assured by increasing the size of farm, investing in more capital, increasing the output per unit of livestock, increasing the crop yields, etc. The so-called deadly parallel column which was quite popular several years ago illustrates admirably the use to which the information was put. In these deadly parallel columns the various elements or factors affecting success were tabulated and opposite each was placed the average, presumably, of the best five, ten, twenty, etc. farms which had been surveyed. In the second column was placed the record of an individual farmer. The inference from such a set-up was that in any case, if the individual expected to be successful, he should attempt to use the same amount of land, capital, the same production per cow, etc., as the more successful farmers. In some instances the average of the best was compared with the average of the poorest. This procedure, however, tended to obliterate the desirable features on the so-called poorest farms. All of this is, of course, questionable, if indeed not erroneous. Maladjustment, the chief cause of failure in any individual case, may be due to a variety of things. In some instances, not too few acres but too many, in not having cows of low productivity but possibly in having cows of too high productivity, in not having low yields but in attempting to get too high yields, etc.

A critical examination of the methods formerly, and to some extent still used, not only revealed the weakness of the methods used, but also indicated

what was needed in the way of improvement. It is evident at the outset that the problems upon which the early workers were giving their attention were more complex than perhaps they realized and that the solution of these problems, insofar as a solution could be found, depended on a careful economic analysis of each. For this reason modern students of farm management are giving more and more attention to economic theory, especially in the field of production economics, and to the development and use of statistical technic. Gradually the idea has been reached that success or failure in farming depends upon the degree to which the various factors are properly adjusted. This has led to a study of maladjustments, their nature and characteristics, working out ways and means by which maladjustments may be controlled and corrected, and finally, in demonstrating under actual farm conditions how the individual farmer can improve the organization and management of his farm.

No delusion is entertained with respect to the perfection of the new methods. In fact it is better to consider them as being on trial. Some progress has been made, but much remains to be done. We are just learning how to study the problems effectively and have only begun to show what can be done in practice. At present a just criticism can be made that we are somewhat long, although not too long, on theory, and short on practical results. The latter has been due largely to the lack of funds and trained personnel. There are very few institutions at which the proper training is available. In fact this is one of the outstanding needs to-day in the whole field of agricultural economics. We must remember that success is dependent upon a large, well trained, enthusiastic group of workers.

RESEARCH RELATING TO COOPERATIVE MARKETING[1]

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Cooperative organization on the part of farmers to effect improvement in the results obtained in marketing long has been held as of advantage. The price disparity in the case of agricultural products which set in after the war was the source of greatly increased activity in this field. More recently the passage of the Agricultural Marketing Act and the formation of the Federal Farm Board in accordance with its provisions have served to focus further attention on cooperation.

The part appropriately played by public agencies in the development of farmers' cooperative marketing organizations is not a matter on which there is unanimity of opinion. While some lean towards the active fostering and promotion of organizations by public agencies, the more conservative take the stand that the proper place of public institutions is that of supplying information and serving in an educational capacity and that it is up to the farmer himself to make the application. My reason for adopting this approach to the subject is that the supplying of information must be preceded by research. Therefore, public institutions interested in agricultural marketing are interested in research in cooperation.

The small producing unit which is the prevailing type in agriculture, precludes the farmer from carrying on extended research programs for himself. Unlike large industrial concerns, the farm plant can not support within it research laboratories manned by chemists, physicists, bacteriologists, economists and statisticians. But an efficient agriculture is a matter of public interest. Better farming practices benefit not only the farmer himself but redound to the benefit of society as well. Tax-supported research in agriculture is

[1] Paper read at the 20th annual meeting of the American Farm Economic Association at Washington, D.C., December 30, 1929.

warranted because public interest is served thereby. It now is a well established policy to include in the public agricultural research program, attack upon economic problems as well as problems which are primarily concerned with the technique of production.

Some may maintain that when farmers organize for marketing they no longer are limited by the small producing unit and, therefore, can establish their own facilities for engaging in research on cooperative marketing problems. This point is not without merit. Larger cooperatives should be encouraged to engage in research activities. However, if it is contended that all research in this field might well be left to the cooperatives themselves, the rejoinder is that this does not meet the requirements of the unorganized farmer who does not have the facilities available. Furthermore, there are many vital problems so broad in their scope that they fall outside the purview of single organizations or even groups of organizations within a given field.

But it is carrying coals to Newcastle to discuss with a group such as this, the justification for engaging in research on cooperative marketing problems. Let us, therefore, rather turn our attention to some research problems within the field. For convenience of treatment, the following classification of problems will be employed:

(1) Statistical surveys.
(2) Historical studies.
(3) Organization plans and operating problems.
(4) Membership relations.
(5) Price and sales policies.
(6) Measuring economic results.
(7) Legal aspects.

(1) *Statistical surveys.* One of the earlier types of research projects in agricultural cooperation was that of making surveys of the number and kinds of organizations, their membership and volume of business, organization features and related points. My own institution undertook such a survey as its first definite study in farmers' cooperative activities. The Office of Markets (now merged into the Bureau of Agricultural Economics) undertook such a survey soon after its inception. Numerous surveys, both state and na-

tional, have been made during the past fifteen or twenty years. They have been decidedly worthwhile in furnishing a picture of the cooperative movement. Repeated surveys have thrown some light on the progress being made and trends in the movement.

It is not difficult to detect impatience in certain quarters with respect to research work in marketing involving general surveys of this kind. The present writer would not want to be held up as a champion of this type of research as being the ultimate goal. He feels, however, that general surveys have much of merit in giving the research worker a better conception of the field and putting him in contact with more fundamental problems. Such surveys are the means to an end rather than the end itself. That being the case, we readily may admit that they have their limitations. The field becomes too broad for detailed study. An actual detailed census is ruled out by the expense it would entail. Reliance has to be placed on the questionnaire method. Returns are incomplete. Officers and managers soon tire of filling out repeated blanks. Questions arise as to whether or not the resulting sample is truly representative of the whole.

Because of the limitations of the questionnaire method, supplementary surveys involving the use of more detailed schedules in the hands of field workers are valuable. Much additional detail can be secured in this manner and, by proper sampling, very good cross sections may be obtained.[2]

Perhaps one may be permitted at this point to express a desire for a greater caution than has been employed at times in drawing conclusions and making comparisons from surveys. Do two surveys made at different times offer an accurate picture of the development during the intervening period? They do not unless proper allowance is given to such considerations as differences in completeness, changes in the price level, the development of different types of organizations and the like. Unfortunately, comparisons have been made and are being made without sufficient recognition of these qualifications. The true research spirit of finding facts and drawing sound conclusions therefrom must not be

[2] Cornell Bul. 461, "Farmers' cooperative business organizations in New York," illustrates a study which combined the questionnaire and interview method.

subordinated to any desire to demonstrate that much progress has been made by farmers' cooperatives.

(2) *Historical studies.* Some excellent historical studies of cooperative developments have been made. Studies of the development of organizations in certain fields such as farmers' elevators, cooperative creameries and tobacco organizations, or of specific organizations, give a better understanding of the problems encountered and the methods employed. They sometimes show that experiences which are regarded as being solely of the existing period have their counterparts in earlier developments. For example, many believe that the employment by cooperatives of court actions to enforce contracts are of recent date. As a matter of fact, tobacco cooperatives of a generation ago employed many of the devices which we think of as being of recent adoption.[3]

General farmer movements have been the subject of various historical studies and these have brought to light many interesting facts with respect to the influence exerted by such movements upon business cooperation. The possibilities of such studies are still worthy of consideration. Institutions having access to historical collections, files of newspapers, farm journals and similar records, may find in them considerable material throwing light on earlier developments.

Studies of movements and of specific organizations which failed to reach the intended goal have a place. There are those who express impatience at considering failures. What they overlook is that failures may teach lessons as valuable as those taught by successes. Careful studies of the causes of failure are entirely warranted because of the light they throw on the essentials for success.

(3) *Organization plans and operating problems.* Under this head we may group a variety of work having as its purpose to delve more deeply into fundamental problems than does the ordinary survey referred to above. Included here are studies of the type of organization, in connection with which consideration may be given to the advantages and disadvantages of different types such as the federated and the centralized, the capital stock and the nonstock, the coopera-

[3] See, for instance, Ky. Exp. Sta. Bul. 288, "The cooperative marketing of tobacco." Also Iowa Exp. Sta. Bul. 211, "Fifty years of farmers' elevators in Iowa."

tive and the ordinary business company plan. Under this heading we also may include studies of the internal organization, the business set-up and practices of organizations, and methods of financing.

There has been considerable argument with respect to the advantages and disadvantages of certain types of organization. Students of cooperative marketing have come to agreement that the important consideration is not standardization to the extent that a stereotyped plan will be followed but adaptation of the plan to the problem at hand. While the broad considerations have been fairly well developed, research students should find further opportunities for their energies in comparing and contrasting different organization types and in determining the underlying factors which decide upon the most desirable type of organization in specific instances. Decisions probably will continue to rest largely upon empirical grounds but some closer approach to definite measurement should be possible.

Business analyses of individual organizations and of groups of organizations of a similar nature have been made in a number of instances.[4] Such analyses tend to cover a wide range of problems. For instance the purpose of one of these studies has been set forth in the following language:[5]

> To enable other cooperators and cooperatives, especially those dealing with tobacco, to benefit by the policies, mistakes, and experiences of this association, the economic and social background in Virginia and the Carolinas, the inception of the association, its formation, organic set-up, operations, membership relations and policies, problems, and difficulties are analyzed in considerable detail.

In another study, the object of which was to consider specifically the business set-up of organizations, the method of analysis employed was described in the following language:[6]

> A cost system was set up and the data for each elevator were analyzed. The elementary costs of labor and management, building and site, equipment, and other direct items were first derived through this analysis, also cost of individual grains and combination costs. These costs were then grouped by

[4] U.S.D.A. Department Circular 397, "Farmers' cooperative business study" (of the staple cotton cooperative association), U.S.D.A. Circular 100, "Business analysis of the Tobacco Growers' Cooperative Association", and Ohio Exp. Sta. Bul. 427, "A business study of the Ohio Poultry Producers' Cooperative Association", are reports of representative studies of individual organizations. Minnesota Exp. Sta. Bul. 231, "Judging creamery efficiency"; Bul. 251, "Economic aspects of local elevator organizations", and technical Bul. 28, "Economic aspects of local potato warehouse associations", are reports of representative studies of groups of organizations.

[5] U.S.D.A. Circular 100, p. 2.

[6] Minnesota Experiment Station bulletin 251, p. 6.

averages and ranges, and statistical methods were used to explain variations. The study was undertaken to discover the facts that cause variations in costs.

These statements are suggestive of the range covered by studies of this character. They have a direct bearing upon the operating efficiencies of cooperatives and are of value both to existing organizations and to those contemplating the establishment of new associations.

Considerable attention has been given to accounting methods and business practices of cooperatives. The continuing lack of uniformity in this field suggests the need of further research to develop improved systems and methods as well as further education to secure more general adoption of them. Pooling methods employed by cooperatives and problems encountered in pooling may well be given some further attention by research workers even though the principles now are well developed.

A number of research projects have given attention to credit problems of agriculture. Some of these have touched upon the credit problems of cooperatives. However, there is room for some specific studies in this field. These may well include consideration of credit needs, purposes for which credit is used, sources of loans, security offered, rates paid, periods and terms of loans, and related information.

(4) *Membership problems.* Cooperative marketing associations are correctly classified as business enterprises. Their problems and possibilities are much the same as those of other business enterprises. However, this fact must not lead us to overlook some important differences. The points of difference arise mainly out of the important part played by the membership in cooperatives. While the ordinary business company produces the products which it sells or else buys those products for resale, most cooperatives are formed to handle the products of their individual members. Ordinary business corporations are commonly controlled by a group of stockholders having most at stake; the vote in the cooperative is equally distributed among the members. The attitude of the members towards their organization; the support which they give it; the relationship which exists between members and management, consequently are very significant factors in the life of a cooperative marketing association.

These problems have come to the front with the establishment of large-scale associations, particularly those on the centralized plan. The difficulties which appeared to the management as being uppermost at the outset were technical difficulties involving problems of handling, receiving, grading, storing, processing, accounting, financing and selling. These all have to be provided for promptly and adequately. But problems arising out of membership relations are fully as important and oftentimes more so. There have been organizations which admittedly have been functioning quite satisfactorily as far as the handling of the commodity is concerned, but which have failed to achieve permanence because of the attitude of members.

Considerable headway has been made in studying membership attitudes in recent years.[7] There are possibilities in carrying this work somewhat further, particularly in studying methods employed in meeting the problems and the efficacy of such methods. Research work in membership problems is helpful both to organizations themselves and to educational agencies. The solution of membership difficulties is primarily an educational problem. Research projects can bring into clear relief the state of mind of the membership and thus throw light on the need for education in principles and for the dissemination of information. It also may bring to light weak spots in the management and operation.

The usual procedure in these studies has been to employ field surveys in which the worker sought answers to the questions on a schedule and recorded the answers as he obtained them. Care must be employed in selecting and instructing field workers to make sure that the answers will reflect the attitudes of the persons interviewed and not that of the interviewers.

There are possibilities of developing some special studies in this field. Many organizations maintain a "house organ" as an aid in keeping their members informed. There are opportunities for further study of the type, form, content, and effectiveness of these publications. It should be possible to establish some check system for measuring the relative effectiveness of various methods employed in building up

[7] See, for example, U.S.D.A. Department circular 407 and circular 41, and Oklahoma Exp. Sta. Bul. 178, "Attitudes of Oklahoma farmers towards the Oklahoma Cotton Growers' Association".

and maintaining proper membership relations. Some such studies have been made in the field of agricultural extension work and suggestions may be obtained from them.

(5) *Price and sales policies.* The end sought by cooperative marketing associations is an improvement in the economic status of their members. The yard stick customarily employed by the members in measuring the value of their organization is primarily that of price comparison. Cooperatives, therefore, have a direct concern in the matter of prices. The particular relationship of a cooperative to the establishment of prices depends upon the organization and the commodity. Purely local organizations as such can have no direct influence on the general market price level for their commodity. The same is true for most large cooperatives handling products which have world markets. They sell on the basis of existing markets and follow rather than lead in establishing the level. However, prices are not a matter of unconcern to these organizations for that reason. Quite to the contrary, prices are of vital import. Such organizations have to determine upon when and where to sell. They have to decide whether an early disposal of their holdings or a slower rate of sale is the better policy in the light of existing conditions. For this reason they are interested in what the facts are and how the market is likely to react to given situations.

Some organizations handling highly localized products or products having localized outlets are even more concerned with prices. For example, it has not been so difficult to bring into existence associations controlling a very large proportion of such localized commodities as raisins, prunes, cranberries, oranges, walnuts and certain types of tobacco. In the case of market milk producers we find cooperative organizations in many of the important metropolitan areas and these associations are factors of decided importance in their local markets. Such organizations frequently have no established market on which to sell or which they can follow as a guide. They have the problem of determining what prices they are to ask for the products. Determining the correct policy under these circumstances is not an easy task as various cooperatives can testify from practical experience in this field.

While research in the field of agricultural prices is not limited to cooperatives, this research is of such vital concern to cooperative marketing that mention of it here is in order. Both public agencies and cooperatives themselves should be encouraged in their efforts to learn more about the factors which influence prices and how prices react to specific influences. Further studies likewise should be made of price and sales policies employed by cooperatives and the results which they are yielding. As is suggested later on in this paper, this offers a field of particular interest to research workers employed by cooperatives themselves.

In connection with sales and price policies, the question of the effect of the sales program and quality improvement upon prices received by producers is worthy of mention. Quality improvement is one of the concrete services performed by some of the outstanding cooperatives. The question of how extensive the effects of quality-improvement programs have been and what the reactions have been on the market has much of interest.

(6) *Measuring economic results.* Because price is the yard stick employed in measuring the value of an organization, price comparisons are frequently being made to prove that one or the other of two marketing systems yields the better results. Unfortunately, the situation is such that figures are being employed to prove that each is better than the other, reminding us of the facetious segregation of prevaricators into two groups—plain liars and statisticians; or the other quip, that while figures do not lie, liars may figure. Statistical workers who do not fit into such a classification might well seek ways and means of answering some of these questions in a more thoroughly scientific manner.

One problem to which I would like to draw attention is the question of how readily and ably cooperatives adjust themselves to changes. It must be recognized that our entire marketing system is subject to constant change. If one establishment adopts a new practice, competitors may have to adjust themselves thereto. For example, a few months ago a leading mail order house announced it would pay the postage on goods ordered shipped by parcel post. A competing house at first refused to follow but shortly afterwards determined not only to pay postage but also to pay freight.

Are livestock shipping associations finding ways of adjusting themselves to truck hauling and to the expansion in direct buying? To what extent are they meeting and can they meet the change in practices? Similar situations occur in other fields and offer a variety of problems for research study.

(7) *Legal problems.* The legal status of agricultural cooperatives has been the object of careful attention both by economists and lawyers and the results of some very valuable studies have appeared in published form in recent years.[8] Legal problems no longer hold the center of the stage the way they did some years ago when full play was given to the idea of long-term, iron-clad marketing agreements. We have not reached the acme of perfection in cooperative law and I, for one, would be interested in seeing some one attack the problem of what further modifications are now advisable in our present cooperative statutes. Such questions arise as how adequately do many of our cooperative laws provide for federations? Are some too narrowly confined in regard to the matter of nonmember patronage? Is the restriction of the term "cooperative" adequate? These and similar questions are worthy of attention.

Research by Cooperatives

A number of the larger cooperatives have found it worthwhile to undertake various types of research work for themselves. Some of this relates primarily to the handling of the product. Careful research studies of losses in citrus fruits have led to the adoption of methods of handling which reduce such losses very greatly. The Canadian Cooperative Wheat Producers Limited, popularly known as the Canadian Wheat Pool, does research work in problems relating to the handling and quality of grain, including studies of milling and baking characteristics. The California Fruit Growers Exchange studies new uses for its products and maintains laboratories in which orange and lemon by-products are developed. The Sun-Maid Raisin Growers Association has been a leader in developing specialty products in

[8] See, for instance, Nourse, "The legal status of cooperation"; also U.S.D.A. bul. 1106, "Legal phases of cooperative associations".

its field. Land O'Lakes Creameries in addition to employing government inspection as a check on the quality of the butter made by its member creameries, also has laboratories in which analyses of the butter are made. This organization likewise is active in finding new uses for various by-products.

Organizations which are extensive advertisers, determine upon their advertising budget and program with the aid of studies of possibilities and results, including a consideration of available media, their circulation and effectiveness.

Organizations which have come to grips with the problem of developing a satisfactory price policy are finding cold-blooded analysis by statisticians and economists a safer basis of action than the hopes and desires of the members and management. A number of milk marketing associations have research workers in this field. The problems of price policy are particularly important for milk cooperatives. They are formed to represent the producers' interests and the latter display the natural human desire of obtaining all they can for their products. The organization managements, however, soon discovered that the highest price obtainable in the short run is not necessarily the most profitable from the long-time viewpoint. The managements of milk producers' associations are forced to take the lead in arriving at asking prices. In doing this they must know something of the effect of price upon both production and consumption and also about the dangers from outside competition. Conditions at a given time may appear to warrant a change in the surplus plan employed by a milk organization. However, the organization is vitally concerned in the consequences of any change, and research is needed to throw light on this.

While the assembling of crop information and the making of crop estimates are not commonly regarded as belonging in the category of research, such work occupies an important place in the research programs of some of the larger associations because of its relationship to the analysis needed in developing a satisfactory price policy. The Canadian Wheat Pool has developed an extensive crop reporting and market information service which occupies a prominent place in the

determination of the sales policy to be followed. The American Cotton Growers Exchange, likewise, in connection with its research program, engages in crop and price forecasting. While the cotton marketing associations have available the results of a more extensive government crop reporting service than is the case with the Canadian Wheat Pools, the Exchange finds it helpful to carry on work of their own in this field to aid in anticipating what the government reports and their probable effects on price are likely to be. The Cotton Growers Exchange also includes in its price studies, price analyses aimed at anticipating seasonal movements as well as temporary fluctuations. Consideration likewise is given to the relation between spot and futures prices, between different futures in a given market, between different markets, and prices of different grades and staples. Such information has a direct bearing upon the hedging operations and sales program of the organization.

Not many years ago such expressions as "orderly marketing", "merchandising", "feeding the market" and "selling in accordance with demand", rolled glibly from the tongue tips of cooperative marketing enthusiasts. Apparently, many of them thought that the basis of such a program was very simple. The idea of a uniform rate of marketing was mistaken for orderly marketing.

Organizations which have been successful in their sales programs have recognized more of the complexities of true orderly marketing. They realize that demand is not uniform and that consideration also must be given to supplies available. A successful selling program necessarily is dynamic instead of static. It is not solved by a stereotyped formula. It must be guided by a knowledge of the market situation and research and analysis play an important part in ascertaining and forecasting conditions. For this reason, larger marketing organizations are giving definite place to research work on these problems and are coming to place greater dependence upon such work.

Time has permitted merely a brief mention of a few specific types of research in the field open to cooperatives. A great variety of problems are clamoring for attention. Some of them relate to technical problems of handling and utili-

zation. Some are largely in the sales field. Price problems constitute a third group. A fourth group includes problems of internal administration and organization. All of these fields need attention and cooperative leaders are appreciating this fact more and more. The research of cooperatives in some of these fields is still in its infancy and in view of its importance to the cooperative movement it is to be hoped that the future will bring considerable expansion.

While it is to be expected that research departments of cooperatives will continue to be held rather closely to problems which appear of immediate concern to the management, the latter may appreciate more and more as time goes on, the desirability of not placing too many restrictions on the field of work. It may be found in many cases that the work of public institutions and that of the cooperatives may be carried on in such a way that they will dovetail very satisfactorily. Progress has been made in this direction as, for instance, in the New England states where research workers of different agencies have a tie-up with a central research council. A close cooperation among research workers in the field is necessary to achieve the greatest possible results. The problems are sufficient in number and variety to provide a place for all of them without resorting to unnecessary duplication of effort.

Discussion by H. Bruce Price
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Research as related to cooperative marketing has developed to the point where it now includes practically all aspects of marketing that have any relation, either immediate or remote, to cooperative organization. Much research, as Professor Jesness points out, is in progress. Much more remains to be done. Varying degrees of progress have been attained in its various aspects. The analytical features of research in cooperative marketing have scarcely started, most research departments in farm economics having only recently emerged from the survey and descriptive stages. As scientific analysis proceeds, the results of research become cumulative and contribute more vitally to the solution of pressing agricultural problems. The experience of recent years seems to bear out this contention.

A problem for workers in this field, not specifically mentioned but implied in the discussion of Professor Jesness, is to give proper balance to a research program. The careful selection of projects that offer promise of valuable results is of course always important in formulating any plan of procedure and particularly when the field is rapidly expanding and so many research workers

are inexperienced as is the case in agricultural economics at the present time. It seems, however, that in view of the recently renewed interest in cooperative marketing that there never has been a time when we should give more careful consideration of what we should include in our research program or give more attention to a new evaluation of method and objectives than at the present time, if we, as research workers, expect to contribute most substantially to directing the national cooperative marketing program now in its embryonic stage.

Three aspects of cooperative marketing deserve special consideration under these new circumstances. These are membership relations, organization problems and price policies. The first of these, membership relations, has probably commanded the least attention up to the present time but it now has a place of outstanding prominence in view of the renewed interest in large-scale, national, commodity cooperative sales organizations. The history of cooperation is replete with illustrations of organizations designed to give farmers the kind of organization the leaders thought they should have and without much thought of what the farmers wanted. Is the movement likely to be repeated in this respect? There are indications that it may. Public research agencies need to obtain a better understanding not only of the wishes of farmers but also of the principles relating to contractual relations, settlement policies, and pooling plans as they affect members. Studies along this line would at least give cooperative leaders cognizance of the situation as regards the attitude of members on these problems. If organization plans run counter to the wishes of farmers, future policies can at least be formulated to persuade farmers of their real needs, providing their wishes and needs are known.

Probably more research effort has been spent on organization problems than on any other phase of cooperative marketing. It has been largely descriptive of organization plans and operating methods, however, and only in a relatively few instances has there been a serious attempt to discover the fundamental factors that are involved. Such description is of course important, as Professor Jesness has pointed out, but its function is chiefly reconnaisance. Few operating problems can be solved by this method. Indeed to attempt to draw conclusions of more than the most general character from such studies is likely to be dangerous from the very nature of available data. Opinions of dealers and those associated with management furnish an inadequate basis for scientific analysis and are likely to produce erroneous results if so used for many organization and management problems. For example, many factors have quite generally been thought to contribute to the efficiency of country grain elevators and many suggestions have been offered for improving this part of the grain trade by those associated with it. Yet a recent careful analysis of the business of a large number of elevators operating under similar conditions in Minnesota shows that about 90 per cent of the variation in cost of elevators handling similar volume of grain is due to two factors, labor and equipment, and that the type of building, commonly considered an important factor, is negligible in explaining why costs vary, so well is the size of the building adjusted to the present volume of business.[1] Only the most thorough analysis of these and

[1] "Economic Aspects of Local Elevator Organization," by Hutzel Metzger and H. Bruce Price. Minnesota Bulletin 251.

other organization and operating problems can contribute substantially to a better understanding of the best size unit, the proper combination of cost factors as well as the most efficient method of handling, buying and selling products. The problems are more difficult, altho no less important, for large cooperatives than for small ones, because there are fewer of them for comparison. That significant conclusions can be drawn for large cooperatives has, however, been recently demonstrated in several studies.

The need for more research in the field of agricultural prices does not require extended discussion for this audience. The success of many of our large cooperatives including those that are being formed and those that will be projected in the future depends in a large measure upon the sales policies of these organizations. It is sufficient to indicate at this point that chief consideration should be given to the study of factors determining seasonal price movements and annual price levels. By this statement I do not presume to imply that an understanding of inter-market relations, consumer preferences, advertising policies and other aspects of the sales program is not important, but the situation is that these features of the merchandising program of cooperatives is, and will probably continue to be handled more satisfactorily than the problem of *when* to sell. This statement is particularly applicable to the great staple commodities such as cotton and wheat that are distributed through highly organized market places.

The second point that I should like to make, and this is also made to give emphasis to what has already been said, is that cooperatives should be encouraged to do more research. The success of cooperative endeavor depends upon the ability of cooperative organization to give *better* marketing services than other forms of business enterprise. Superiority of service is in turn largely dependent upon better information than is now available to competitors, or available data better analyzed, or both better information and keener analysis. A rather comprehensive research program is therefore imperative for any large cooperative. Certainly it should be more extensive than at the present time for in spite of the various kinds of research mentioned in Jesness' paper as now undertaken by cooperative marketing organizations, a survey of research activity would show that in general it is far below the amount that can reasonably be expected of large cooperative organizations. Small associations will likely be compelled to rely largely upon research by public agencies, trade associations or large cooperative associations. Large organizations on the other hand should not expect to lean heavily on public agencies in this respect. With their present resources, agricultural experiment stations, departments of agriculture and the farm board can probably use their research funds to the greatest public advantage, at least for the immediate future, by confining their research activities chiefly to the development of research method and the training of research workers. The time may of course come when these agencies can or may be expected to render a marketing advisory service. In the meanwhile, or until these agencies are more amply financed, large cooperatives should expect to rely chiefly upon their own resources for research.

RESEARCH METHODS IN FARM FINANCE[1]

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A special committee recently appointed to consider the scope and methods of research in agricultural credit reports that "research projects relating to agricultural credit thus far outlined and likely to be outlined, characteristically approach the subject from five different angles, namely: the area, the institutions, the types of credit, the functions, and the commodity." As a means of classifying research projects, such a grouping is satisfactory. However, for the purposes of this paper it does not appear feasible to follow the committee's classification. Here the fundamental points of view of the three groups primarily interested in agricultural credit,—namely, the farmer or the man who borrows, the loaning institution (i.e. company or individual) and the general public which is interested principally in the relation of agricultural credit to the economic system,—are emphasized. Projects representing each of the five classes first enumerated could be planned for each of the three types of research as here outlined.

As in any new field of research the various subdivisions have not as yet been clearly separated. Such subdivision occurs only after extensive preliminary studies have been completed and workers have had an opportunity to determine the relationships among various phases of the general problem. Conditions within the field must be described before workers are prepared to begin work upon the more detailed aspects of the problem. Not until this stage of progress is reached may very much analytical work be done. Most activity up to this point is description and is probably more useful to the workers in the field than helpful to the general public. In this preliminary work the usual procedure seems to be the use of such secondary data as exist, supplemented with farm surveys, surveys of financial insti-

[1] Paper read at the 20th annual meeting of the American Farm Economic Association at Washington, D.C., December, 1929.

tutions or interviews, newspaper stories, questionnaires, and similar devices for collecting data. Much of the research in agricultural credit has been of this nature. It has been informative rather than analytical. Much more needs to be done along informative lines in the various states before more detailed analytical studies may be safely conducted.

After these ground clearing surveys are out of the way and the credit problems are clearly distinguished, ways and means of attack may be considered. It is at this point that it seems highly desirable to adopt some definite point of view with respect to the problems. As stated at the beginning of this paper, these problems can almost always be developed from the point of view of the farmer, of the loaning institution, or of the general public.

If the research is planned to be directly helpful to the farmer his position as a borrower must be carefully kept in mind. His point of view should be emphasized and the research should be planned so as to enable him to become a business borrower. Information should be uncovered to permit him to learn to use credit intelligently, to control credit instead of being controlled by it. Such credit research involves study of the farming business from an angle not usually encountered. It means, first of all, studies to determine the credit facilities in an area, the typical uses made of credit by farmers, the effect of different types of farming upon credit uses, the effect of different combinations of enterprises upon credit uses, the relationship between size of farms, value of land and credit uses, the means of securing farms, the effect of different forms of tenure upon credit uses, and the relationship between credit uses and profits, the effect of all these factors upon the proportions existing between long and short term credit, and the inter-relationships among the above factors. Some of this information can be secured by survey. The nature of the information raises the question as to whether or not farmers will readily give some of the necessary data. Enlarged accounting routes such as those being conducted in Illinois, Minnesota, and Iowa, should lend themselves to securing these data perhaps better than does the farm survey. Farmers cooperating upon a route study come to know and have confidence in the man

who visits their farms periodically. They are more willing to reveal credit information, which ordinarily is highly confidential, to such a man than to an enumerator who is making a farm-to-farm survey. Thus far these routes have not been used to secure specific credit data so far as I have been able to determine.

The detailed statistical route or cost-of-production route offers further opportunity to make contributions to the field of farm finance. The detailed credit history of farmers, their use of credit, their attitude toward credit, the relation of enterprises to credit demands and the development of rational credit programs can only be done through detailed study of individual farm businesses. Such studies will be in the nature of case studies but the validity of the findings can be checked if the detailed route is in the midst of, or a part of, one of the larger accounting routes.

The impression must not be given that complete explanations of farmers' uses of credit, their attitudes, their credit histories and their credit programs can be based upon records obtained solely from farmers. These credit uses, attitudes and histories are determined to no small extent by the financial institutions with whom the farmers have dealt. Farmers should not be wholly blamed for unwise use of credit. No small part of the blame rests with the credit agencies. Hence these institutions must be examined carefully to determine what part they have played in producing the existing conditions.

Not until a mass of information from both farmers and financial agencies is made available and the profitable uses of credit clearly shown will the farmer be able to make the most effective use of credit as a tool in his production program. Now he fears debt because he is not prepared to handle it safely. Almost all businesses make an extensive use of credit. The farmer should be taught to do likewise, but often the institutions serving him are as much in need of education.

Basic to the development of a good credit program is a thorough analysis of the type of farming prevailing in the community. Every state has numerous distinct types of farming and frequently numerous sub-types as well. Each

type of farming has its peculiar credit requirements. Needless to say research relating credit needs to the type of farming is almost wholly non-existent. It is known in a general way that beef cattle and hog farms use credit differently than do dairy farms, that grain farms have other credit requirements, and that truck farms, fruit and cotton farms all have their peculiar credit needs. It is probable that these needs differ among farms of the same type depending upon their location with reference to other important producing sections. Market outlets also will exert an influence. Not until all of these influences are recognized and their relative importance established will it be possible to set up an ideal program for the farmers producing the different commodities. And this, it appears, should be the objective of one important phase of farm credit research.

Many problems of the institutions dealing in farm credit may be developed from the farmers' point of view. The adequacy of facilities, interest and other charges, seasonality of demand and general loaning policy all have important farm management implications, and can be developed at least partially from this point of view. Such problems as those relating to interest and commission charges cannot be completely solved without studying the costs of operating the loaning agency. Seasonality of demand is closely related with the supply of loanable funds which in turn is related to general business conditions and to competing demands. General loaning policy is necessarily bound up with the question of land values, income from farming and tenancy. Thus almost every problem cuts across other fields and cannot be fully developed without supporting work in related fields.

The farmers' point of view with respect to institutional problems can probably best be studied through surveys of such institutions supplemented wherever possible by public records. Probably sufficient data can be gathered in this manner to satisfy the farm operator's need.

Complete development of the credit field will involve much work from the institutional point of view. Much benefit will necessarily accrue directly to borrowers when lenders learn more about their own businesses. Greater efficiency of oper-

ation resulting in lowered costs and reduced losses resulting from more intelligent lending will be reflected in lowered "interest" charges, decreased commissions and other expenses. Studies of this nature can rarely be effectively conducted by means of the survey. The survey, if used at all, is merely a means whereby the important problems can be distinguished, thus bringing them more forcibly to the attention of those in charge of the loaning agencies. Following this preliminary work, if indeed it is necessary, the best procedure would be detailed study of the businesses. This involves the complete cooperation of the operators and is not always easy to get. Probably an unhappy experience such as that suffered by many loaning agencies during recent years is more conducive to research than is an experience extending over a period of successful years. At any rate examination of the records of the financing agencies should yield much valuable data regarding size of the business, number of employees, costs, losses and business practices which would throw considerable light upon the questions of whether or not a community is adequately served and what are the logical steps in case the facilities are inadequate either because of numbers, sizes, or efficiency of the institutions.

Often analysis can be made of records in the possession of public authorities. Usually these are in sufficient detail to permit a comprehensive analysis only in the case of unsuccessful institutions. While much useful information may be obtained, equally detailed data from successful institutions must be studied in order to show clearly the differences in organization, business practices or both, which differentiate the successful institution from the unsuccessful institution.

Although public records are detailed only in a few cases the investigator must not overlook the valuable mass of material included in the various reports that are submitted periodically to various public officials. Such useful information as seasonality of demands for loans, seasonality of surplus funds and the relations between various asset and liability items for different classes of institutions can be found. As yet such data are almost untouched.

The third principal point of view which should be emphasized is that of the general public. Society is interested in farm finance not because it is concerned with increasing the profitability of farming *per se,* but because it is desirable to have an essential industry like farming efficiently financed. Society also is interested in knowing whether or not farm credit facilities are being developed at the expense of society generally. It is thus desirable to plan research to show clearly the place of farm finance in the whole financial system. The relationships between the various fields of finance must be determined. It is only through such study that judgments can be formed of the social efficiency of our farm credit program.

Under this division should be developed projects having for their objectives the relationship of agricultural credit to prices, to land values, to tenancy. Here, too, should be examined the effect of general business conditions upon demands for agricultural credit. Studies should be planned to show whether or not the agricultural industry pays more for the use of credit than does other industry. Some problems of great interest to agriculture arising out of recent changes either economic or political must be studied from this general point of view. Such questions as branch banking and group banking, with all of their possible effects upon agriculture, should attract the attention of our most capable workers. The relationship between such a movement and the banking system in general is necessarily involved in a study of this nature. The recent establishment of the Federal Farm Board with its tremendous power as a financing agent for cooperative marketing associations similarly raises questions of public policy. Much detailed research would have to be done before judgment could be passed as to the wisdom, from a public point of view, of enacting into law the assumption that cooperative marketing associations have not been adequately financed by existing agencies.

Opinions will no doubt differ greatly as to the proper methods to follow in attempting to solve some of these problems. It would seem that the survey can be ruled out immediately. The survey in such a case would be merely a collection of opinions. There is some place for the detailed

study of records of various kinds, the results to be expressed quantitatively, but the use that can be made of such results is not great. In any case they would be quite incomplete and could be used merely as evidence. Research in this particular field must necessarily be qualitative in character rather than quantitative.

Other problems of a general nature such as indexes of indebtedness, fluctuations of interest rates, terms of mortgages and extent of mortgage indebtedness will also be considered in this division of the field. Such studies have been based upon data secured from many different sources. The federal census, state censuses, surveys of farms and lending institutions and information supplied in reports of loaning agencies have been the principal sources. Thus far the great mass of source material found in the records of county officials has been for the most part overlooked. These data offer the opportunity of constructing better indexes of mortgage debt and interest rates than any that have thus far been prepared. They supply a check upon the accuracy of census data. By comparison with records of sales of farm land these data will show the relationships of movements of farms and amount of credit. Credit extension and foreclosures can be studied. These data from public records throw some light upon almost every question, and furnish almost complete answers to many questions pertaining to farm mortgage credit.

Farm credit is, of course, only one phase of research in farm finance. Of equal importance, perhaps of greater importance, is research upon the financial organization of the farm. It is as essential that farmers know the best financial organization for their particular type of farming as for them to know how to obtain credit and how to use it.

In the first place the financial organization is closely related to size of the business. In speaking of the proper size of farms we usually think of size in terms of physical units. The attempt is made to select a farm of such size that the elements of production will be used most efficiently. The selection of farms of efficient size presupposes the investment of a sum of money.

In studying the size of the business comparatively little

attention has been paid to the size of the investment necessary to conduct the most efficient sized plant for the various types of farming. Still less attention has been given to the proportions that exist or should exist between owned and borrowed capital used in the fixed plant and for working capital. Almost nothing is known of the most profitable proportion between fixed and working capital. These and other related questions can only be answered by studying records of the farming business. The study of simple farm accounts will answer some of the questions. For others very detailed financial records will be needed. One phase of the financial organization of the farming business merits special mention,—namely, farm reserves. The farm business man has not been accustomed to setting up reserves available, at least in part, in a reasonably liquid form. Any surpluses he has accumulated have generally been used to reduce indebtedness, make improvements, add to working capital or to buy a larger fixed plant. Occasionally a farmer will loan money to his neighbors or make other investments. Should the farmer build up a reserve to be invested in securities or some other form of liquid investment as protection against unforeseen contingencies? If the building of such a reserve is good business practice, how large should it be?

This question, it will be perceived, is closely related to risk in agriculture, particularly to risk in production, but is not unrelated to risks of price change.

Studies should be made to throw light upon risk in producing various commodities in different areas under different types of farming. Studies should also be inaugurated to enable us to weigh the risks of price decline.

Just what methods to use or approach to make in research of this kind is almost impossible to state. These questions have received so little attention that the earlier studies should have for a principal objective the development of methodology.

It has been quite impossible to discuss all of the research methods which might be used in the field of farm finance. This will be done much more adequately in the report of the Advisory Committee on Research in Agricultural Credit. In this paper three points of view have been particularly

stressed. It is hoped that upon the completion of the necessary preliminary studies, research will be conducted more definitely from the farmers' point of view and directed toward furnishing him with information he can use in formulating an intelligent credit program. Research conducted from the point of view of the loaning institutions will be concerned more particularly with problems dealing with the efficiency of the institutions engaged in agricultural finance. Such research will result in benefits to farmers through more adequate service and a tendency toward decreased costs. The third group of problems involves more particularly the social point of view.

Discussion by B. M. Gile

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Dr. Black has given a clear statement of the points of view and possible sources of data in farm finance research work. One might wish that there had been time for a more extended exposition on the application of research methods to the analysis of problems. The merits of the enlarged accounting route as a source of data have been presented and it seems desirable to discuss some of the limitations. There may be a question as to whether such routes usually represent a random sample of farmers. For certain purposes this may be unimportant, but for others it would decidedly limit the application of results. Moreover, data from accounting routes are not available in many states. The assumption that accounting routes will yield more valuable results than the field survey method cannot, of course, be supported objectively until after studies based on data from the former source have become available. It seems probable that each source will be found to have advantages for particular purposes.

My experience in both northern and southern states has been that farmers readily reveal credit information if properly approached. Inexperienced enumerators and long schedules, however, are not suited to such an undertaking. Credit data obtained from farmers by the survey method when checked at the banks and with county records have been known to show a high degree of accuracy. The time consuming nature of research projects which begin with primary sources, together with the scarcity of workers who are prepared to analyze such data, make it highly improbable that this method will be used in excess of the need for it. In all research there is a greater danger of merely threshing over old straw.

It is not quite clear whether Dr. Black intended to use interchangeably the term farm finance appearing in the title and the term agricultural credit as used in the body of his thesis. If so, the question may be raised whether farm finance studies from the point of view of the farmer should be limited to the farmer who borrows. It would seem that research in farm finance should be

of equal importance to the farmer who may be in position to use his own resources in gaining control over the instruments of production as to the individual who must use credit. A review of published reports will show a tendency to emphasize the farmer as a debtor rather than as an employer of land and capital goods in production.

Research in farm finance is concerned essentially with applied economics. Except as a by-product, it is doubtful if it will contribute many new principles of finance. It should, however, contribute much to the modification and greater efficiency in the art of applying old ones to the business of financing agriculture. The volume of farm credit legislation in recent years emphasizes the need which had been stressed for a careful evaluation of the relation of farm credit to the general credit structure. There is a need for the development of an intelligent general policy not only for the protection of the public, but also for the protection of the farmer.

The paper under discussion calls attention to inefficiency in the use of capital in agriculture being in a large part the fault of the institution serving agriculture. The weakest institution in the farm finance structure has no doubt been the country bank. Modifications in this system are rapidly taking place. Changes in control are in large part being influenced by investment syndicates. The interests of agriculture make it desirable that the research work of farm economists should contribute something to the solution of the country bank problem.

Reference has been made to the fear which the farmer has of debt. This does not seem to apply to the bulk of cotton farmers or to farmers in the middle-west at least during the land boom. No doubt farmers like other classes engaged in business not owned on a corporate basis sometimes fear debt. The education of the farmer in matters of investment and credit has not kept pace with his education in matters of physical and biological management. Agricultural extension workers have seldom discussed the basis of credit or the proper use of capital on the farm. The result is that most farmers still regard such matters as highly secretive. Because of this, the farmer does not secure the advantages which would come from discussing contemplated commitments with others. Whenever the farmer learns to extend his thinking beyond the matter of outlay to the completion of the cycle, the results will more often be satisfactory. A fund of information provided by research, available to the farmer, the country banker, the extension economist will contribute much toward a realization of improved practice.

The public, the farmer, and the institution should find something of value to them from the results obtained in most research projects whether the point of view be the place of farm finance in the general scheme of things, the institution, or the universe in which the farmer operates.

AGRICULTURAL ECONOMICS INVESTIGATIONS IN SCOTLAND

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In the following pages a brief account is offered of the principles on which investigations of the economic position of the farming industry in Scotland are based, and of the methods employed. Reference is also made to the origin and present organization of the work.

Scotland is a small country. Its maximum dimensions from north to south and from east to west are approximately 270 miles and 130 miles respectively. The coast is much indented. North and west of a mountainous chain running in a northeasterly direction from the River Clyde, the country is wild and mountainous. Between this and a parallel belt of high land in the south lies the central plain, which, with some coastal areas mainly in the east, holds most of the industry and agriculture of the country. The surface is extremely diversified, and the land used for agricultural purposes ranges in physical and geological character from rough and mountainous pasture on thin barren soil, to some of the richest lowland cultivated soils in Great Britain. The annual rainfall varies from upwards of 100 inches in parts of the western area to about 28 inches in the southeast. The climate is mild and equable along the western coastal fringe; it is more severe and unequal in the arable districts of the east.

The total land surface of Scotland is only 19 million acres in extent. Of this, approximately 3 million acres are under arable cultivation, 1½ million acres are permanent grass and 9¾ million acres are rough mountain and heath grazings. The remainder of the total area is taken up by towns and villages, roads and waste lands. The population is mainly centered in the Midland Valley between the Highlands and Southern Uplands, or to a lesser extent in the seaport towns along the east coast. In some of the remote districts of the northwest, the social structure is still com-

paratively primitive and simple. As a result of all these factors, there is considerable diversification of farming, ranging from very extensive sheep rearing at one end of the scale, to very intensive arable cropping at the other. The typical sheep rearing of the hill lands becomes modified in very different ways as the surface falls away into the valleys and plains of the east and south. From another standpoint, the almost self-sufficing economies of the "croft," which may still combine both agriculture and fishing, is in strong contrast with the highly industrialized farming of the southeast.

It is probably this great diversity in farming systems and in agricultural organizations within a comparatively small area that gives to agricultural economics a peculiar interest in Scotland. Here is presented, in miniature, an epitome of the economic development of agriculture. This may call for a corresponding adaptation of a technique in analysis and in interpretation. Already it has compelled close attention to the influence of physical environment upon farming systems in order to account for differences otherwise inexplicable. It has compelled, further, an attempt to classify farms by type in order to provide a basis for advisory services and to measure with sufficient statistical accuracy the economic status of the industry. An assumption that homogeneity of organization would produce equal results over considerable areas would be unsound.

The systematic collection of accounting evidence upon the economic status of the agricultural industry in Scotland is of very recent date. During the years 1919-1921, some cost accounting records were collected by the post-war Agricultural Costings Committee, but this work was not continued. In England, provision was made for carrying on costings investigations by the appointment of "Advisory Agricultural Economists" at the university departments of agriculture and the agricultural colleges, and the Agricultural Economics Research Institute at Oxford has been working on similar lines since 1913. A new direction was given to the work in Scotland by the report of the committee appointed by the Department of Agriculture for Scotland in February, 1925, to examine and report on questions of farm accounting and

economics.[1] This committee reviewed the systems of farm accounting in Europe and America, and reported in favor of a simple system of financial accounts. It recommended that the Department of Agriculture should attempt to exhibit from year to year the general profitableness (or otherwise) of the agricultural industry, somewhat on the lines of the Danish system, but with modifications suited to the different conditions prevailing, special attention being given to definite types of agricultural organizations. The committee assigned a limited rôle to cost accounting, and would confine it in the main to the study of farm labor.

Work was commenced in October, 1927. An account book was designed. The cooperation of the outdoor staffs of the agricultural colleges was sought and obtained. A guarantee of anonymity for individual accounts and the circulation of average comparative figures was offered to farmers. A rapid preliminary study of the agricultural statistics was made to decide within what limits of sizes of farms accounts should be sought. Farmers were visited individually, in company with the county agricultural organizers, promises of cooperation were obtained and account books issued. By the end of 1928, about 75 farmers were sending returns regularly to the Department and as many more had promised to do so. A large number of these were keeping accounts for the first time. During the autumn of 1928 and spring of 1929 each of the three agricultural colleges appointed an "Agricultural Economist," who took over from the Department the collection and compilation of the farm accounts for their respective areas. In subsequent developments of the work, there has been close collaboration between the college economists and the Department.

The preliminary survey of the agricultural statistics revealed that a more thorough analysis was required in order to exhibit both the character and the distribution of the systems of farming followed. Arrangements were therefore made in collaboration with the Statistical Branch of the Department for a reclassification of the annual census returns received from farmers for the latest period for which they were then available, namely, June, 1927. It was soon ap-

[1] Published by H. M. Stationers' Office, 1926.

parent that analysis of these returns would reveal information of value for economic studies in several directions.

Analysis of Farm Statistics

The census schedules received annually from every occupier of agricultural land of one acre or more in area report certain particulars; as on 4th of June, as to total area, areas under arable cultivation, permanent grass and mountain or heath grazing, acreage under each crop, number of livestock of each of various classes, and number of full-time or casual workers employed. In the annual agricultural statistics published by the Department, parish and district or county aggregates are compiled. The schedules do not give a complete account of the farming, but they suffice as a basis for classification. The Valuation Rolls, which are the nearest thing to a cadastral survey, are made up annually for each county for fiscal purposes, and furnish information as to the annual value of each holding and the tenant's occupation.

In analysis, the first step is to bring together detached pieces of land forming parts of the same agricultural units. A list is then prepared for each parish of these "consolidated" holdings in order of size, with details of cropping and stocking in columnar form.

Next, by reference to the Valuation Rolls, holdings not in agricultural use are segregated. There may be a large number of these in urban or residential districts. Next are separated out the holdings used for agricultural purposes, but whose occupiers describe themselves as mainly employed in some other occupation or calling. These are generally rather small parcels of land. The callings of these occupiers are then tabulated. A third group is next formed of small holdings occupied by persons calling themselves farmers, of not more than 50 acres, or if larger than 50 acres, with not more than £50 of annual value (or rent). The fourth group contains farms other than small holdings. The group totals are then aggregated for larger administrative or geographical areas.

This initial grouping has a considerable effect upon the calculated average size of the agricultural unit and serves to clarify conceptions of the normal organization of the small

holdings. This latter point is made the subject of special study, attention being given to the degree of specialization found to exist, to the modal size or sizes associated with specialized activities, and the organization characteristic of each group. The way is now open for the study of the records of representative small holdings.

In classifying the larger holdings, regard is had to the proportions of arable land, permanent grass and rough-grazing, the rotation practised on the arable, the presence or absence in significant quantities of special crops—i.e., potatoes—the concentration of livestock per 1,000 acres of land, the ratios of breeding cattle and sheep to feeding stock, the labor employed and the rental value of the land. In the parish lists, an index letter is put against each farm to signify the group into which it is to be placed. There will be relative uniformity in type of farming in parishes where conditions are homogeneous; in others considerable variety may be exhibited. Thus, in the neighborhood of large villages or towns, dairy farms may be interspersed with other types; again, in parishes including a river valley and adjacent high lands, small cultivated holdings and extensive grazing farms, as well as intermediate farms, may be found. The parish boundaries are now ignored and farms are grouped for a larger area, selected with due regard to geographical features, climate and situation.

The next problem is the order of arrangement within each type in order to determine the modal organization. This is comparatively simple in dealing with farms similarly situated as regards soil and elevation. It may suffice to retain the initial arrangement and classify according to size of holding. If this is fairly constant, but the farms vary in other respects, they may be rearranged according to the emphasis placed upon that factor which is the chief characteristic of the type, i.e., the proportions in crops and grass, or in sale and forage crops respectively, or according to the number of cows, or the ratio of milking cows to followers. For example, the greater number of farms may lie between 150 and 200 acres in size, with successively smaller numbers in each 50-acre group above and below that size; or the most common number of cows may be 25 to 30, with de-

creasing numbers in each 5-cow group above and below that number. The average measures of all other features of the farm organization—areas under crops, numbers of other stock, etc., are calculated for each group. In such manner, varied according to the type of farming, may statistical expression be given to that type.

Before proceeding to more complex cases, it may be opportune to recall that the objective in view is to measure the position of agriculture as it is. Our first concern is with the actual, not the ideal. The actual, in a country where land has been farmed for many generations, represents the cumulative experience of farmers of varying grades of capacity and energy. In taking samples from which to draw accounts it is necessary, if we are to obtain a correct measure of average achievement, to include a sufficient number of farmers in each group. Probably fifteen or twenty taken at random would be enough. In the simple cases described, it might not be necessary to take samples from more than three groups—the modal group and one group on either side of the mode. From three such groups, a fairly complete financial picture of the whole series would be obtained. Each sample set of accounts, moreover, would reveal a considerable range in results within the group and would provide the college agricultural economist, through whose hands they pass, some material for the study of cases of success or of failure on which to base his advisory services in aid of improvement.

Rather more difficult problems of classification are offered in districts where in response to unequal physical conditions, farming systems present a series of forms through which one type merges into another. This may be the case where hills of considerable elevation slope away gradually into lower plains. An example occurs in the Border area of southeast Scotland. On the hills rising to upwards of 2,000 feet, farms consisting largely of hill grazings rear considerable numbers of sheep. With the gradual descent to lower ground more and more arable land appears, the size of farm decreases, ewe flocks are smaller but of earlier maturing type, feeding succeeds rearing, cattle become relatively more important, and rents are higher. A number of

factors are changing together with altered conditions, but the variation in no one agricultural factor taken alone expresses quite satisfactorily the variation in type. It has been found in this case that the rental value per acre of the land offers the most suitable basis for classification. Size alone, with varying soil and elevation, is inadequate to describe the magnitude of productive organization. Rental value combines in itself a measure of the relative advantages of situation, and of soil and improvements, and is an index, even if a rough one, of productive capacity; and area multiplied by rent per acre is a better indicator of the size of the productive unit than either taken alone. In the Border area, a thousand farms, grouped according to rent per acre in 5/- groups revealed curiously similar average rents *per farm* in each group, a fact which suggests that for the type of farming based upon ewe flocks, an economical unit of organization is represented by an area of land varying in size according to its quality.[2] The application of this concept to other farming systems has not yet been tested.

Thus, bringing the farms together into groups defined by their rental value per acre, we are presented with a series of types varying only in the degree of emphasis placed upon the several factors in the farm economy. The emphasis may change in different directions for the several factors—i.e. sheep may decrease and cattle may increase—but the change will be regular for each factor.

To complete the picture, the size distribution within each rent-group is determined, and the "sampling" for the collection of accounts can now proceed. In a graded series of farming types such as is here presented, it may be unnecessary to draw samples from each rent group. Accounts drawn from a sample of 20 farms of modal size in the inferior rent group, one or two samples of modal size in intermediate groups, and a final sample of modal size in the superior rent group may suffice to produce a reasonably full financial description of the whole range of farms. The number of samples will, of course, be determined according to the nature of the data. Consideration must also be given to the total number of accounts that can be dealt with.

[2] This phenomenon was first observed by Wm. H. Senior of the Economics Branch of the Department.

Account Book

A brief reference to the form of account book will suffice. Each page is in duplicate, the upper leaf being detachable. Carbon sheets are provided so that the farmer may keep the book as a permanent record and send the detached copies to the college. The information recorded is:

(a) A statement of farm area, elevation, soil type, acreages under various crops, normal yields and usual methods of use or disposal; circumstances controlling rotation followed; kinds of livestock carried and circumstances limiting their numbers; number of male and female workers, whether paid or members of family, and the rates of remuneration in cash and in kind; whether farm is owned or rented and its annual value.

(b) Inventory of live and dead stock, in quantity and value throughout year.

(c) List of implements and machinery grouped according to rate of appreciation allowed.

(d) List of accounts outstanding at the beginning of the year.

(e) A page for each month of the year containing, (i) a simple account of cash received and paid with the quantities of produce involved in each case and with cash in balances brought and carried forward, and (ii) a diary of seeds and manures sown, of quantities of grain threshed or of potatoes, etc., lifted, of amounts of unpaid family labor performed, of home-grown produce consumed in the farmhouse, and of the numbers of livestock on the farm on the last day of the month.

(f) An adjusted implement and machinery valuation at the end of the year and a list of outstanding accounts at that date.

(g) A closing inventory of live and dead stock.

(h) A trading or profit and loss account built up of the valuations and a summary of cash receipts and payments (with quantities involved) with adjustments for internal transactions and outstanding accounts. A columnar analysis sheet is attached for compiling the summary of transac-

tions. The trading account is compiled as for a tenancy in every case.

(i) Opening and closing balance sheets and a supplementary account of the transactions arising from the ownership of the land in the case of owner-occupied holdings.

The account book is thus built up on simple double-entry principles. It aims at a quantitative as well as a financial balance. The design of the book provides a check upon the completeness of the entries and permits of an assessment of the influences of season and of price levels upon the farm results. Data are obtained on which to determine the social and economic status of the farming type in terms of its self-sufficiency, the extent of its dependence upon family labor, its capitalization and its returns, its capacity for providing employment. Normally, the annual summaries are built up at the colleges from the duplicate sheets sent in, but in some cases the farmer balances the accounts himself. The summaries are transferred to cards which are written up in duplicate and sent to the Department. Then the figures are converted to 100-acre equivalents, which are entered on the cards and one of the two is returned to the college.

It is thus proposed to assess the economic status of the industry from year to year for the country as a whole by the application of accounts to carefully selected samples of the farms. The work of classifying the farms will not be undertaken each year; reclassification at the five-yearly intervals may suffice to record changes of importance in the organization of the industry. The annual accounts will show the trend of change as well as the position year by year. For the information of the cooperating farmers, the practise will be followed by giving them, in addition to the balanced accounts for their own farms, average figures for the other farms in the group to which they belong. These averages will be comparable with their individual results since, by the process of classification within a defined geographical area, uniformity of type has been secured. It is probable that for explaining varying degrees of success amongst farmers in the same group, a more detailed examination of their expenditures and returns may be necessary. The ap-

plication of the refinements of cost analysis would, however, only be made for the measurement of relative efficiencies amongst farmers in similar situations. This work would be undertaken by the college economists.

Applications

The classification of farms by types and the determination of the numbers in each group, and the aggregates of crop areas and of livestock numbers in each group also, seems to open the way to a more thorough examination of the economic problems of the industry than would otherwise be possible. Quantitative as well as qualitative expression is given to its organization. It seems to be essential to know the number of farmers and the area of land affected in any description of the incidence of depression; to know the quantities of produce and the size of the unit of production when considering the efficiency and improvement of marketing systems; to be able to estimate the quantitative effect of legislation designed to assist the industry; to know the relative importance of farming systems and farming practices in different areas if the influences of physical environment is to be assessed, and if the limits within which farmers are able to vary their methods is to be understood.

Investigations in agricultural economics are in their infancy in Scotland. By coming rather late into the field, it has been possible to profit by the experience gained in other areas. The attempt is being made to establish the foundation of fact upon which to base inferences as to connections between cause and effect and at the same time to get a measure of problems. The statistical work in classification is already serving to assist an enquiry into the marketing of livestock in Scotland and has made possible postgraduate work in determining the correlations found to exist between physical environment and farm practice. But it is too early yet to speak of success or of failure in this work. The position of the agricultural industry in Great Britain is so profoundly affected by conditions external to itself that the economist may frequently find that what is economically sound for promoting agricultural development at

any given time is overridden by considerations weighing more heavily in a mainly industrial community, or is liable to be invalidated owing to new circumstances arising in other areas. On account of this, it may be all the more important to be able to visualize correctly the possibilities of adjustment within the industry. A comprehensive view of the present position, which is the starting point from which to move, and the base line on which to build, appears to be primarily necessary.

In broad outline therefore the present scheme of activity embraces:

1. Statistical enquiries, conducted at the headquarters of the Department of Agriculture for Scotland. These are designed to give quantitative expression to the present organization of the farming industry and to provide a basis for sampling farms, with a view to obtaining financial accounts from representative groups of farmers.

2. Accounting enquiries, conducted by the Agricultural Economists at the three agricultural colleges at Aberdeen, Edinburgh and Glasgow for defining the economic position from year to year, of the sample groups of farms indicated by the Department's statistical enquiries. The accounts collected provide a basis for local advising work. Summaries are sent to the Department for fitting into the statistical framework.

3. The preparation, at the Department of Agriculture, of an annual statement relative to the economic status of the industry in its various forms, based upon the statistical investigations and the accounts received from the college economists.

4. Collaboration with the Departments of Geography and of Agriculture of the University of Edinburgh in an attempt to measure the correlation between physical factors—elevation, climate, soil, distance from centers of population, etc.—and farming practice. The statistical information relating to agricultural practices is being compiled at the Department of Agriculture. Collaboration with soil workers at the colleges is being arranged. In the absence of agreement as to the classification of soil types and also of soil

survey maps, this collaboration will take the form of submission of specific problems.

5. A quantitative enquiry into the marketing of livestock in Scotland, embracing a survey of output, of assembly, and of transfer to consuming centers, and an examination of the present organization of the business of marketing.

THE ORGANIZATION AND DEVELOPMENT OF AGRICULTURAL ECONOMICS IN RUSSIA

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Agricultural Economics was born in Russia in 1737, when Sergi Votchkoff translated into the Russian language and adapted to Russian conditions the book of the German economist Florian dealing with the subject. This book of Votchkoff's contained a number of chapters on housekeeping and the technique of farming, as well as much information on farm management, borrowed from different European treatises and encyclopedias. By the beginning of the Nineteenth Century, this book had passed through four editions. During much of this period it was the only handbook on agriculture available for Russian farmers. It was only in 1776 that the first original Russian work, a detailed handbook on managing a farm using the peasant labor of serfs, was published by Desnitsky. This handbook contained much detailed data as to the management of such a farm and also forms for an original bookkeeping system. Just at this time also, a Russian officer named Bolotov, who had served in the war against Frederick the Great, began publishing articles on the Mecklenburg Pasture System. He also edited a special journal called "The Magazine of Economics," and became the center of agricultural science for his generation. Also toward the end of the Eighteenth Century and in the early Nineteenth Century, a number of writers endeavored to transfer to Russia the principles of intensive fodder and grass farming of England, which had also been introduced into Germany by the famous Shubart from Kleenfeld.

It must be understood that at this time farm management was closely tied to the technique of animal breeding and husbandry. Problems in land survey, systems of farming, and crop rotation, even surveys reporting income and expenditures of individual peasant farms, were included in the same discussions with methods of sowing, soil cultiva-

tion and selection of plants. This combination of technique and farm organization is very apparent in the works of Telechov and particularly in those of Professor Pavlow of Moscow University. These men were followers of Thaer's works in Germany.

There were, however, a number of treatises and monographs dealing with farm organization alone, notably the famous pamphlet of Sakariev, published in 1801, entitled "New Methods of Organization of Peasant Settlements and Collection of the Landlord's Revenues." Professor Ludogovsky was the first to issue a handbook treating farm management and bookkeeping as absolutely independent subjects.

In 1861, after the liberation of the peasants in Russia, the Government founded its first agricultural high school—Petrovsky Academy—in the suburbs of Moscow. Many young men were sent abroad to be trained for teaching in this academy. Among these was the young Ludogovsky, who studied agricultural economics, farm management, and cost accounting in Germany, France and England. After a number of brilliant lectures on these subjects, he published in 1875 his classical handbook entitled "The Basis of Agricultural Economics and Cost Accounting." This book continues to the present day to be the only handbook for students in high schools, in spite of the fact that the materials presented and the theories advanced relate to the first half of the Nineteenth Century.

Toward the end of the Nineteenth Century, several new handbooks and textbooks appeared which for the most part were Russian adaptations of German books from the school of Theodor von Holz. At this time the large estates of the landlords were slowly decaying, the land being sold as small peasant farms. The methods employed on these peasant farms were of the sort that had been handed down from earlier generations, giving little evidence of rational farm management and technique. The Russian agricultural economics of this period gave but little attention to farm management, rather stressing the national point of view and the possibilities of capitalism in agricultural enterprises. The works of Professor Lenin and of his contemporaries, For-

toonatoff, Bajaeff and Vernen determined the direction of the thinking of this period. Much of their writing was largely statistical in character. The only author who dealt with problems in farm management and agricultural taxation was Professor Skvorzoff of the new Alexandrian Institute in Poland.

With the beginning of the Twentieth Century, the situation changed. Organs of local self government undertook a number of sweeping measures for the improvement of peasant farming. Agents of the government, the so-called Zemsky (County) agriculturists, whose number had raised to 9,000 by the beginning of the World War, stimulated improved methods and the reorganization of peasant farms. A thick net of agricultural co-operatives spread all over rural Russia. At the beginning of the World War, over three million peasant farms belonged to these co-operatives. The Agricultural Congress of 1911 drew up a plan for the establishment of new schools and centers of science, in which farm management was to take an important position. The writings of the leading professors of this period, of Tschelinzeff, Makaroff, Broozkus, Mazievich, Ribnikoff and Tchayanov, laid a foundation for the existing science of farm management in Russia. War and revolution have slackened its progress, but after 1925 there began a gradual revival, which under the influence of the new programs of reorganization promulgated by the USSR, has in these latter years taken on new energy.

The Teaching of Farm Management

At the beginning of the Twentieth Century there were only two chairs of agricultural economics and cost accounting in Russia, one in the Petrovsky Academy in Moscow, occupied by Professor Fortoonatoff, and the other in the Institute at New Alexandria in Poland, occupied by Professor Skvorzoff, and after his death by Professor A. N. Tschelinzeff. But shortly thereafter a new chair was established in the Polytechnical School in Kieff, with Professor Bajanoff occupying it. Also in 1913 chairs of agricultural economics and farm management were established in the newly founded agricultural high schools in Voroneg, St.

Petersburg and Omsk, and in the agricultural high school for girls in Moscow. Furthermore, the Petrovsky Academy added a special chair of farm management, which was occupied by Tchayanov.

After the war and revolution, the demand for work in these fields grew to such an extent that a number of new agricultural schools were founded, and in general two chairs were established in each school, one for agricultural economics, which included the national basis of agriculture, and another for farm management and taxation. To fill these chairs, many young men were called from the Moscow schools, and also a number of eminent agriculturists who had shown an inclination for dealing with economic questions. Most of these chairs are at present just beginning to develop their work. The methods employed are extremely varied. In Moscow the lectures on farm management and taxation begin in the third academic year, after the students have already had courses in political science and agricultural economics in their first and second years. The instruction in farm management and taxation runs over nine months, six hours per week, two of which are devoted to lectures in the theory of farm management and four to laboratory work and seminars. The laboratory work consists of calculations of cost of production, taxes, amortization, valuation of agricultural improvements and economic analyses of crop rotations. The data used in these analyses are taken from actual farming, each student being given his own set of data. In the second half of the year, the students undertake actual double-entry cost-accounting analyses for actual existing farms. They determine by special methods the income from the various branches of the farming business and agricultural farming as a whole. They undertake to determine for their farms the cost of horse labor per day, the cost of production of fodder, etc. In the seminars, the students make reports and discuss theoretical questions in which they happen to be interested. For all this work, practical manuals are prepared, which are revised each year.

At Moscow about six hundred students take the third-year course in farm management. They are divided into

twenty-four groups, which are handled by a professor with nine assistants.

During the fourth year the students in agricultural economics at Moscow do seminar work two hours weekly with detailed organization plans for actual farms. Those wanting to specialize in the management of large farms, draw organization plans for farms of from 500 to 3,000 hectars. Those specializing in work on peasant farms draw organization plans for small farms and for the organization of villages and small regions. Those interested in co-operatives make plans for cooperative enterprises. All of these students also have to do practical work for a year on some large farm. They have to write research reports on problems in farm management, and after graduating must present annual reports of their farm management experience.

Research Work

At the beginning of the Twentieth Century the research work in farm management took two directions. A number of agriculturists compiled detailed monographs of individual large farms. An example of this approach is the research of Mankovsky on the farm of Guta, which describes 30 years of farming on a large sugar beet farm. The other direction which research and farm management took was the study of peasant farms by local statistical bureaus for purposes of taxation. The statisticians of these bureaus collected a large amount of material on costs of production and particularly on the cost of labor and transport for various systems of farming and the resulting revenues. These analyses went to the extent of undertaking a complete farm inventory and statement of receipts and expenditures and calculation of net incomes. The workers following this line were evidently influenced by Professor E. Laur of Switzerland, but their methods were original for the most part. It was upon the cost accounting materials thus obtained that Professors Tschelinzeff, Makaroff, Ribnikoff and Tchayanov based their studies of peasant farm management, out of which developed a new school which came to be called "The Organization and Production School." Tchayanov's book published in Germany in 1923 under the title "Die Lehre

von der Bauerlichen Wirtschaft'' summarizes the ideas of this school.

During the war and revolution, what research work was carried on was in connection with the chairs in the more important schools and by the economic department of the Peoples' Commissariat of Agriculture, corresponding to the United States Department of Agriculture. Much of the research work during this period was devoted to the different types of peasant farms, directed to the end of determining the most rational system of production for each. These workers dissected the European part of Russia into very small regions according to the type of agricultural organization prevailing in each. Professor Makaroff worked out standards of production and labor norms for all of these regions, with a view to establishing the amount of land to be cultivated by a single worker under various systems of farming, and the revenues which would be sufficient for the maintenance of one family. Professor Tchayanov made a study of the optimal proportions of large farms under various systems of agriculture.

In 1919, there was established a special Institute of Agricultural Economics, which had on its staff nearly all the important workers in the field of agricultural economics and farm management. Later two more institutes appeared, the International Agricultural Institute, which studied the peasant movement and the political problems connected therewith, and a special Agricultural Section of the Communistic Academy in Moscow, which devoted itself to national agricultural economy. The Moscow Institute of Agricultural Economics principally studied problems of organization and production.

In the ten years of its existence, the Scientific Research Institute of Agricultural Economics has published forty volumes dealing mainly with problems in farm management and taxation. It is devoting itself especially to analyses of agricultural costs and planning of agricultural enterprises. Cost of production analyses under conditions of peoples' economy in the USSR has an entirely different character and purpose from cost of production analyses in America. In USSR, all the supplies of farm products are

actually under monopoly control of the State, and the problem of determining prices becomes the central problem in agricultural policy. Any mistake made in calculating cost of production will be fatal to the agricultural output itself. The Institute has therefore carried out extensive analyses of costs on 1,000 peasant farms, accumulating materials for computing the cost of production of cotton, flax, sugar-beet, sunflower and grain.

The research directed at establishing methods of farm planning has been started by the Scientific Institute quite recently. It is aimed at reforming the organization of the existing large State farms and establishing a consulting bureau for large grain farms ranging in size from 2,600 to 36,000 hectars, which are now being projected by the Government of the USSR.

It is of course impossible in this short article to describe the methods and present the results obtained as a result of the research program in Russia. We can safely say that we have submitted ourselves to the influence of the German school of Aereboe and Brinkmann, and also to the American authors, but that the methods of investigation which we are following differ widely from those of these countries. The Russian science of farm management can be considered to have developed its own character.

In conclusion, it will be of interest to mention a few facts concerning the condition under which farm management is carried on in Russia. The departments of farm management in the important schools have, beside the common halls, some two or three rooms for scientific work which are provided with libraries and large collections of graphs and plans. The budget of such a chair is from $1,000 to $3,000, wages for professors and assistants not included. The twenty-three provincial experimental stations are supported on a more modest scale. The Institute of Agricultural Economics has at its disposal about $1,500 and is housed in a palace which formerly belonged to the Princess Yusoopoff, with sixteen large halls in it. It has a library of over 100,000 volumes of Russian and foreign works on economics and farm management. This Institute, as well as others of its kind, has for a number of years been endeavoring to build

up an exhaustive library in its field. It is intended in due time to translate into Russian all the classical works relating to the subject. In recent years the German works of Thünen, Holz, Aereboe, Brinkmann, Drzymovsky and others have been made available, and publication of American authors is just being started. It is hopeful that in the coming ten years, the Russian agricultural economists will have for their use a full library of Russian and foreign authors on all problems of farm management and taxation.

MODERN TENDENCIES IN FOOD DISTRIBUTION[1]

PAUL L. MILLER
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In food marketing, developments in process or in prospect, are absorbing the interest and serious attention of all students of marketing. These developments raise many questions, some of which have received much consideration by teachers and investigators. For a long time we have heard about waste and inefficiency in food marketing. Standard text books, with their elaboration of marketing functions and functionaires, provide a basis for understanding these engineering aspects of marketing.

Other aspects of marketing have received less scientific study. We have no very adequate criteria for judging the efficacy of the various tendencies in business organization among the various interests represented in the food markets. Questions involving this consideration have become increasingly pressing in the marketing of agricultural products. Chain stores appear to be putting retailing on a more efficient bases. But, what new problems do they create for the grower or manufacturer who would widen and broaden his outlets? Public policy declared by the Marketing Act holds that marketing organization energized mainly by private business has failed to provide the farmer with optimum market benefits and that through farmer owned and controlled cooperative agencies, he may remedy his market situation. What may be said about these propositions? They are typical questions arising today in the channels of commerce and trade which challenge students of marketing science.

Undoubtedly our topic seems hopelessly broad and general. Who can present a simple and limited classification of modern tendencies in food marketing? Your program committee wishes frankly to admit that it has not attempted to arrange a well rounded program on the subject. On the

[1] Introductory statement made by the chairman at opening of the round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

contrary it has sought deliberately to focus attention upon the supply side rather than upon the demand side of food marketing. We have leaned toward the farmer end of the marketing process rather than toward the consumer end, not forgetting the fact that one end presupposes the other.

Consequently the particular trends that we have chosen for discussion are those that appear to be effecting the relations between growers or processors on the one hand and distributors on the other. Some of the factors that seem rapidly to be changing these economic relationships are mass retailing by chain stores and cooperative buying associations, cooperative large scale selling and merchandising by growers, the development of speciality merchandising by processors, and the formation of so-called food mergers. Our program will deal with some of these developments. For the most part our speakers come directly from businesses, or connections with businesses, whose activities are examples of these modern tendencies in food distribution.

CHAIN STORE METHODS OF BUYING FRESH FRUITS AND VEGETABLES[1]

H. A. BAUM
ATLANTIC COMMISSION COMPANY, INC.

The phenomenal growth and expansion of chain food stores throughout the United States during the past few years has to a large degree revolutionized the system of distribution and retailing of perishables. Also, at the same time, the increase of production of fruits and vegetables has more than doubled during the past ten years and at this time the consumer can secure any and all commodities throughout the entire year as new producing areas have been developed throughout the United States and in addition thereto many foreign countries supply our markets with perishables that cannot be produced during certain seasons of the year.

The Atlantic Commission Company, Inc., is a subsidiary of the largest food chain store organization in existence. This parent organization opened its first cash-and-carry store during the year 1911, although prior to that time it operated a considerable number of stores and wagon routes, specializing in comparatively few commodities, mostly teas, coffees, spices, etc.

At this time it operates in excess of 16,000 food stores throughout the Eastern and Middlewestern portion of the United States and the Southern portion of Eastern Canada and its present sales are running at the rate of approximately $1,200,000,000 annually. The foundation of its success is SERVICE. For any organization to successfully progress and develop it must render a high service to the contractual parties, including producers, manufacturers and consumers. Continuity of relationships must be built on goodwill and service to those furnishing us merchandise, as well as a dollar value for a dollar received from the consumer, and this contractual relationship must be mutual.

[1] Paper read at round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

The chain store system of distribution and retailing is bringing about an economic evolution and has narrowed the spread of cost between producers, manufactuers and the consumer; although transportation rates and packing costs have increased considerably, the producer is receiving a greater percentage of the consumer's dollar today than ever. This necessarily has created some prejudice from within the ranks of independent retailers, jobbers and wholesalers. In fact, these factions, through their state legislators in many states have proposed high taxation on chain stores, although in a great number of these states we purchase from the producers, manufacturers, etc. more merchandise and in some cases two to three dollars for every one dollar sold to their consumers. This trade balance to producers is characteristic in large agricultural States with the exception of the more populous industrial states like New York, Pennsylvania, Ohio, Illinois and Massachusetts.

The Great A. & P. Tea Company entered the field of handling the more perishable commodities only six or seven years ago and soon found the necessity of setting up an intermediate organization as a contact between the producers and its retail stores, hence the birth of the Atlantic Commission Company. Its tonnage has been built from approximately 4,500 cars during the first year of operation to a tonnage of approximately 80,000 cars for the year 1929, although this does not include the entire amount of tonnage in fresh fruits and vegetables for the parent company. We purchase for its account some additional 20,000 to 30,000 carlots from other distributors aside from the tonnage originating from our own grower contact marketing service. The sales of the Great A. & P. Tea Company covering fresh fruits and vegetables will approximate $160,000,000 during the present year and its distribution business is the largest tonnage of any factor in this field. We feel that we are rendering a marked degree of efficient service in narrowing the spread of cost between the American producer and consumer, although by no means have we reached our ultimate goal.

Chain stores operate on the dollar percentage basis and they are usually satisfied with a net profit of 2 to 3 per cent

above their operating costs. We have had many contentions set forth that we are endeavoring to under-buy markets. However, this is not the case, as there is no incentive, nor is it good business to be forced to the necessity of looking for new supply sources from time to time, as it is only through volume of supplies that we can economize to a high degree in our operations. Thereby we eliminate waste and sales expense, as our outlet is a consistent day-in-and-day-out one and not of a speculative nature.

We feel that there is a necessity for higher standardization in the Department of Agriculture's gradings than exists at present as the tolerable allowances on gradings set up as standards at present embody a considerable percentage of unsalable merchandise, and in our total dollar sales annually at present there is embodied several millions of dollars of worthless merchandise, which necessarily enters into costs, including transportation, packing, etc. If stricter grades were adhered to it would have a tendency to maintain higher values and less volume of merchandise. Likewise standardized packages should be used for all states, as we find that there is considerable variation in packages used in different producing territories which necessarily has a tendency to cause considerable variation in market values, instead of maintaining more uniform values.

Through our close cooperation with outstanding cooperative organizations, we have rendered special sales service to stimulate consumption during the peak movement of their respective crops, and have benefited the producers in helping to move surplus crops by featuring such commodities at special sales prices. An illustration is the Georgia peach crop of which we have sold several hundred cars in one week at the heighth of the movement. This is also applicable to watermelons. On one occasion, we sold through our New England and New York stores 1,500 cars of Maine potatoes during a period of one week.

LARGE SCALE SELLING[1]

W. H. Baggs
General Manager, American Fruit Growers, Inc.

The perishable fruit and vegetable movement consists of about 1,000,000 cars. The Company with which I am associated handles about 50,000 cars. My viewpoint is taken from the demands of the industry, as well as our own experience.

Federal and State laws, supplemented by the adoption of uniform trading rules, regulate the conduct of sales as far as domestic business is concerned, governing both buyer and seller. Credit risk is reduced to a minimum. A few of the basic principles involved in large scale selling are the following, all under centralized control at shipping point, as well as in the consuming centers:

1. Standardization of the product.
2. Control of sufficient volume.
3. An adequate foreign, as well as domestic, outlet.
4. A nationally advertised trademark.

Standardization

Standardization in perishables is much more difficult than that of a manufactured article. Production is subject to all the whims of the weather; heat, cold, dry, wet; either extreme, not sufficient or too much. We are faced with standardization as to varieties, as well as grades and pack, of the various commodities. Style must, of necessity, enter into our calculations, especially under present conditions where beauty as well as quality is a selling point.

Volume

The trend during the past decade has been that certain districts, sometimes confined to local communities, other times to counties and quite frequently to entire states, con-

[1] Paper read at round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

centrate in the production of a particular commodity. For instance, citrus fruit in California and Florida, potatoes in Maine, etc. Large scale selling of national character is, for instance, practiced by confining operations to citrus fruit alone. Another trend is that in which volume is obtained by combining a variety of commodities. The latter plan lends itself to a year 'round operation much more readily than where volume is confined to a particular commodity. Where commodity volume selling is practiced, it does have the effect of predominating the market so far as that particular commodity is concerned, predicated on the volume being sufficient for control. However, volume, in either event, is essential, much more so in the future than in the past on account of the great change in retail merchandising resulting in the concentration of buying power of the retail outlet.

Perishables must recognize and adopt the same merchandising principles as followed in manufactured lines; namely, advertising of their product, which entails the identification of their products. With few exceptions, the products of the industry do not lend themselves readily to a system of identification through to the housewife. We have no difficulty in this respect as far as the wholesale trade is concerned, or even the retail trade, most of whom are sufficiently informed to distinguish not only grades and packs, but to select their commodities from the standpoint of the district in which they are produced according to the reputation of that particular section for character and eating quality.

Outlet

It is essential to have an outlet in every consuming center with equal opportunity for supply. It involves the seller adopting the system of keeping all outlets accurately informed of his offerings, not only for the year and month, but day and hour. The very character of the business does not permit accumulation in the consuming centers beyond a few days' requirements. It is essential that the railroad service be such as not only to insure against deterioration enroute, but deliveries on schedules that are just as accurate and well maintained as passenger service.

An outlet should be fully adequate to take care of the inlet regardless of the volume, which is a most difficult operating problem in view of the fact that the majority of our products move in volume within a short period. Most of our commodities must be disposed of the moment they mature, and nature has a method of bringing them into maturity within a short harvesting period.

Large scale selling in perishables under the system in vogue does not involve the necessity of heavy commitments to individual buyers, but it does involve supplying thousands of consuming centers with their daily requirements. We have facts and figures indicating the consumptive power of the various large commercial consuming centers, and must be kept intimately informed of the supplies available for the country as a whole, as well as the quantity enroute to market. The present system of distribution does not permit any wide variation in prices existing in one portion of the country to the detriment of the others regardless of the many statements to the contrary. There are times when local production adjacent to consuming centers does affect the price at which the consumer is able to buy in one market versus another.

There was a time in the history of perishables when mixed carloads of various fruits and vegetables were sold to small consuming centers in order to give them an opportunity to buy the fresh article in the volume that they were able to consume. Under this practice where the demand did not develop into straight carloads of the various commodities, these small markets are now able to keep adequately supplied by trucking from larger commercial centers with the development of good roads and the automobile.

While not satisfied with our efforts, nevertheless those of us who have traveled abroad, as well as at home, and have had an opportunity for comparison, must realize that the present system of distribution of perishables enables one to obtain any fruit or vegetable in season anywhere in the United States regardless of whether one is located in a large consuming center or in a small village. Resort hotels in the most isolated places ofttimes carry the most elaborate menus of fresh fruits and vegetables regardless of the sea-

son of the year. Not only fresh fruits, but most vegetables are now available the year 'round. At this moment, we are bringing fresh peas of the most delicious flavor from the west coast of Mexico, as well as from California. Green beans of stringless variety are coming from Florida and are available to anyone wishing to buy. Head lettuce is another year 'round vegetable that is available in not only the large consuming centers, but to every consumer, no matter where located, priced entirely within his purchasing power.

To revert to the subject of large scale selling, one must, in order to meet the requirements of domestic production, especially in the major fruits, develop and maintain a foreign outlet, under even more exacting conditions than those which prevail for domestic sales. Certainly a standardized product is necessary to insure sound delivery in these far distant points. Unfortunately, a mistaken idea prevailed during the early history of our large scale production, which was to ship to the foreign markets that portion of our products which was not salable at home, mostly on account of inferior quality. Anyone engaging successfully in the foreign business will have to adopt the practice of giving them as good as is produced, certainly under conditions where they are willing to pay as much money as could be obtained in the domestic markets. Volume is essential, in the foreign game because herein large scale selling to individual buyers does become a fact.

Advertised Trademark

Advertising is essential, not only from the standpoint of educating the consumer to the uses of the commodity, but as well, the building up of good will for your own particular product.

The establishment of direct contact with the foreign trade is just as essential as in our domestic relations. The most important American distributors of perishables, including the company with which I am associated, now deal directly with their own authorized representatives in the foreign field and carry on their own advertising program. This is true particularly of Great Britain, where we have had some interesting experiences recently in building up the demand for

citrus fruit. In the year 1929, Great Britain consumed approximately 1,500,000 boxes of California oranges. In 1923, it consumed 13,000 boxes of grapefruit; in 1929, closely approximating 700,000 or 800,000 boxes. Our own program in Great Britain enables us to supply grapefruit the year 'round under one brand, using fruit from Porto Rico, Florida, and California.

What is true of the development in Great Britain is equally true of the Scandinavian countries, Norway, Sweden, Denmark, and Finland, and the countries of western continental Europe, Germany, Holland, and France. We have available and are supplying American fruits to South Africa during their off-season. Alexandria alone took over 70,000 boxes of apples in the season 1928-29. This year Calcutta took one of its first direct shipments, consisting of 5,000 boxes of apples, preceded by the erection of a cold storage plant on the part of some Englishmen interested in developing trade of a perishable character not only for Calcutta, but the interior of India. It is true that hardly one out of ten persons in India can afford to buy fruit, especially foreign fruit, but if we can get that 10 per cent, it will afford an immense outlet, especially under conditions where we can get the Indian railroads to provide refrigeration service into the interior.

The Orient is being developed; Hongkong, Shanghai, and The Straits Settlements, and we are endeavoring to have Japan raise its embargo against American fruits.

South America has long been a large consumer of North America apples—Brazil and the Argentine—and recent development has been along the west coast—Chile—through the friendly cooperation of steamship lines plying between the west coast of North and South America.

Therefore, I say that large scale selling involves not only an adequate outlet for domestic sales, but as well foreign development, all of which entails vision and a large expenditure of capital.

We welcome discussion of this subject, as we recognize that the trend is toward large scale selling. The development of the industry has unquestionably been retarded, as the very nature of the business has encouraged a "scattera-

tion'' of sales effort in the most extreme sense. From the standpoint of efficiency alone, large scale selling is inevitable, and under conditions where buying power is developing so rapidly, sales power will be forced to meet the situation, not from the standpoint of fear and trembling of the large buyer, but with his cooperation, as he recognizes more acutely than even the seller that large scale selling will more nearly meet his requirements than the present method.

A practice has grown up in the chain known as the sale of ''loss leaders,'' especially in perishables, a practice looked upon by the business man, as well as the general public, as unethical. Yet no individual chain feels that it could afford to change the practice. Like many other evils, it was and may now be carried on by the chains to their indirect advantage, but we have reason to feel that they recognize that the development or even continuance of the practice may lead to serious consequences. When large scale selling is coupled with large scale buying, possibly sufficient statesmanship will have developed among the buyers, as well as among the sellers, to enable them to handle this phase of merchandising in a manner that will insure greater stability to the industry.

TRENDS IN THE DISTRIBUTION OF MEATS[1]

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Recent trends in food distribution have not up to date affected the meat trade as much as they have many other food trades, perhaps for two leading reasons:

In the first place, the meat trade has long been an integrated or direct distribution trade and is therefore less influenced by recent integration trends.

In the second place, the perishable and unstandardized nature of meat prevents its easy adaptation to many modern distribution methods.

Some revolutionary methods that are now subjects of much popular discussion must be classed as experiments rather than as trends, since, guard it as you will, the word "trend" implies a substantial change warranting a forecast.

Among the trends that may be recognized as beyond the fad stage or beyond the purely experimental stage may I mention the following:

There is a decided trend toward improved refrigeration and other improved equipment in retail stores. This is permitting the sale of more perishable products. It is also increasing greatly the investment necessary to maintain a shop, and is therefore tending to shift retailing into hands that are better financed. Presumably this should be leading toward greater stability in the retail meat business.

There is a trend toward standardization. Government and retail agitation has spurred the packing industry on to a more rapid development of commercially acceptable grades for carlot products. Many of these grades are appearing under company brands. Perhaps more will follow. Earlier maturity of most classes of livestock, and increasing uniformity of breeding and feeding standards, have favored

[1] Paper read at round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

standardization. Increasing purchase by chain stores, department stores, and other large scale retailers in car-load lots has led to more rigorous grading, to clarification of grade terminology, and to increased sale by grade rather than by inspection.

There is a trend toward packaging. The less perishable products are increasingly appearing in cardboard, grease proof paper, and cellophane. This trend has perhaps not advanced as far as is popularly supposed, but it is a distinct trend. Chain stores have required increased packaging of bacon, but have stuck largely to bulk lard.

There is a trend toward more fresh pork and less cured pork. Improved transportation and improved refrigerating equipment, both for wholesale and retail units, has permitted the offering of more of the fresh, highly perishable items.

There is a trend toward chain store retailing. Grocery chains, in order to offer a complete food line, have added, and are adding meat markets. Perhaps fifteen per cent of the retail meat trade of the United States is now passing through chain stores, perhaps more. Chain business continues to increase. Chains of straight meat markets are growing, but not rapidly. Voluntary chains are handling some of the less perishable items. One voluntary chain handles fresh meats. Cooperative purchasing by retail meat dealers is growing, but is almost entirely restricted to the purchase of groceries to carry on the side.

There is a halting trend toward integration. There has been the absorption of a very few small companies by the big four. There has been a significant merger of companies in eastern Canada, and there have been mergers of a few small, poorly financed companies in the states. One large chain store company has added another slaughtering plant and a processing plant, but continues to buy most of its meats from other packers. Another chain has a curing and processing plant, but is not expanding those activities. One large Canadian packing company, and several small packers in the states have opened chains of meat markets, either under their own or other names. They are beginning to appear successful. A large grocery merger has purchased

a packing plant in the east and is running it as an experimental unit. The Big Four are prevented from integration by the "Consent Decree," and possibly by more fundamental handicaps. Even if the decree were modified there is much question as to how effectively they could now compete either in grocery wholesaling or meat retailing.

There is a trend toward increased car route and carlot trade and a relative decrease in branch house trade. Competition has become so keen in many branch house territories that packers have lightened their own overhead burdens by shifting to a car route basis or by closing or consolidation of branches.

There is a trend toward trucking and away from short rail shipments. Hard roads, improved trucks, and dry ice have materially increased the trucking radius, and are continuing to increase it.

Packers are experimenting with the sale of hard chilled retail cuts of meats. Hard freezing is definitely established as a trend in the distribution of fish, but is merely an experiment up to date in the meat trade. Consumer acceptance has not yet been established for any form of frozen meat, particularly at very high prices. Retail meat dealers are not well equipped to handle it and are not inclined to favor it. It is, however, significant that those packers who have tried it most seem to be most sincerely confident of its ultimate success.

THE NEED OF SCIENCE TO DETERMINE OUR TRENDS IN DISTRIBUTION, AND OF DISTRIBUTION ENGINEERS TO GIVE US AN OUTSIDE VIEWPOINT OF OUR BUSINESS[1]

GORDON C. CORBALEY
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For the same reasons that the methods employed in manufacturing are being greatly changed by scientific management, mass production and other forms of classified knowledge obtained from practical experience, American business is now moving into an era of science in distribution.

The passing of commodities from maker to consumer is becoming such an intimate process that the old hit or miss methods can no longer be depended upon for continuing success.

The entire structure is so closely fitted together that we must have scientific facts regarding the controlling influences in each commodity market and we must really know an increasing measure of the scientific rules for our moves in distribution if we are to be wise enough to keep the different organizations upon a basis of sound relationship to each other and to operate the entire business machine in such a way as to be of maximum value to the public.

The need for this knowledge is coming now with startling speed because we are going through a period of change where the movement from point of production to point of consumption is passing into broader channels and these naturally are being straightened into more direct lines. The things that experience taught us yesterday must give place to some knowledge of what is to be tomorrow.

Perhaps you will regard it as a figure of speech, but I like to think of distribution as now being laid out according to engineering principles.

The various channels of commodity movement find their way over different types of economic topography and the

[1] Paper read at round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

controlling power that regulates their flow is gauged from the place of contact with the consumer. Only a small part of this entire operation is physical enough to be thought of in terms of the ordinary application of engineering. Most of the problems are those of economics and of human relationships.

But if you will get off at a distance and look at the landscape of this great spread of commerce, I believe you will agree that these flowing streams are capable of a large measure of engineering appraisal, provided always we have in mind that the controlling factors are financial and human rather than the physical things that we visualize with the word engineering.

Perhaps "science" is the right word to describe the truths that we are getting out of the knowledge that we classify from day to day but I want to use the term "engineering" because it keeps before us the fact that we are dealing with a science of flowing things. Whatever the name—science or engineering—our present need is to classify immediately the truths as we learn them until we can establish certain laws and trends that will be generally accepted.

An immediate step toward better thinking should be the agreement among you gentlemen that such a science is in process of forming. Then we must have progressive research until we really know the things that are now largely the subject of conjecture. Each operation must be studied in the field of practical experience with the same analytical thoroughness that we have learned to use in the laboratory or the testing room.

For instance, in the great trade in foods—the one subject with which I am familiar—we need controlling principles about assembling and packaging at points of production, the economic and human elements involved in the various movements to and through the retail outlets, the economics of price in controlling consumption, the economics of sound merchandising service, the fundamentals by which we can measure advertising control, and, above everything else, we need some simple sound formulas for gauging the almost complete control now being exercised by the attitude of consumers toward different foods. Each subdivision of

these subjects must be studied and then there must be an exchange of information until we are able to state an increasing number of the really important laws.

As this vision is developed into a practical science, the efficient man from among the present pioneers, now called research consultants or marketing counselors, will become a recognized scientist, whom I will describe as a distribution engineer, because that name helps business men to think of the service as something practical and important.

The Food Institute, as the research and educational organization of the nation's largest business, has a special interest in this because food distribution probably has been the least scientific of all the commodity movements and now the methods of food distribution are being most altered by the change toward more scientific principles.

You must bear in mind that the original food distribution was a simple exchange of commodities which slowly progressed into a wandering and creeping flow that took food from almost every section of the country and delivered food into every place where men lived.

The necessities of life to the amount of about $20,000,000,000 a year were assembled from several millions of farmers and passed through a few scores of different types of channels to contact with the consumer at several hundred thousand individual retail outlets.

When the pressure of advertising and forced selling was superimposed upon this criss-cross structure, which had grown along lines of least resistance, it was entirely natural that there should be a duplication of effort and a tangle of relationships. It was equally natural that when this tangle became burdensome, strong men should fight through to controlling positions in the trade fields that they could reach.

First we had the uniting of retail outlets and the reaching of these chain organizations back toward points of production.

Then the manufacturers began to group themselves so as to gain power and to realign their distributing forces to meet the new conditions with which they had to deal.

Now the Federal Farm Board has been created by the

United States Government charged with the responsibility of bringing the producers of each raw food into a great merchandising organization.

Not one of these movements toward pulling services or commodities into groups has yet progressed to where the new control handles a majority of a service or of a commodity except in isolated cases like California walnuts and oranges or the imported bananas. One food chain is doing about 7 per cent of the grocery distributing but all the retail chains together control only about 35 per cent of the service in that field. The two giants among the manufacturing groups are packing houses with sales much smaller than the aggregate of the greatest chain and none of the manufacturing combinations of recent growth is handling much more than 1 per cent of the wholesale volume. The commodity groups that the government is sponsoring are just in process of forming.

But the force of this movement is now great enough in each commodity group and in each phase of distribution to supply a leadership which is rapidly forcing a realignment.

Independents among wholesalers and retailers are being drawn into voluntary chains. The Food Institute survey shows that in the grocery field alone more than 400 of these organizations now include 60,000 outlets handling in excess of 25 per cent of the retail grocery business.

The manufacturers who have not consolidated with others are discussing mutual relationships and are seeking ways to tie retail outlets to their service in a more direct way.

If you will just get a broad vision of this great food business, you will see that the crude wanderings of the different commodities are in process of being turned into some pretty well defined and steadily broadening channels. To date, this process has largely come through the brute strength of able men and has all the awkwardness of a pioneer movement.

Now, the great forces are in such close relationship with each other and the widely diffused ownership makes the public interest so great, that this evolution can no longer proceed soundly and conservatively if it is subject only to the control of individual impulses. We must have an in-

creasing measure of scientific knowledge about each operation—why this has been and what we may expect that to be.

It is difficult to arouse the food trade leaders individually to the need for science because our growth into a broad industrial position is so new. The present commanding officers are largely the men who had the power and initiative to drive through to success. They are pioneers with the individuality of the pioneer and therefore slow to recognize any law but their own experiences.

Most of these men want to continue to do business along the lines that brought success while they were fighting through the conditions of yesterday in command of very different organizations from those they captain to-day. They naturally have difficulty in recognizing that the field in which they operate is very different and is becoming more different each month. In all the history of food distribution there never was a time when methods of handling were changing as rapidly as they are now. Each change is based upon certain influences that are appearing to a greater or lesser extent in widely scattered sections of the country. A change may be no more than an emergency shift by business executives in trouble or it may be along the lines of a fundamental theory that is altering the entire flow of goods.

Because of our detached viewpoint at the Food Institute offices we feel that most of these business moves fall into fairly definite classes and that the average tendency of the actions taken under certain conditions has now progressed far enough to develop some trends or laws. I will not attempt to define any of these. That is a broader function than should be exercised by one group of men. However, I will suggest some fields for work by listing the following as a few of the problems now confronting food distribution:

How can a simple formula be developed to supply the facts necessary to control production and distribution of a food commodity?

To what extent must a price level be adjusted to balance consumption against a shortage or a surplus?

What sort of indices of production volume and prices can be prepared that will be easily understood by the trade?

How can controlling facts regarding production and dis-

tribution be distributed so as to accomplish their function?

How can the interference of the Federal Farm Board with economic laws be so handled as to produce a minimum measure of uncertainty in market operations?

What are the developing trends in kinds of food, food packaging and food handling, including the trend at points of food consumption?

What types of public eating places are to gain and which are to lose; with deductions as to the different types of commodities that will be affected?

What is to be the style and type of "new kitchen" of superconvenience that is to be operated in the American home?

How rapidly will this come and what classes of consumers will soon be affected by it?

In what form—fresh, frozen, dried or canned—will each commodity be preferred in this kitchen?

What will be the style and types of packages?

How can each commodity group study the readjusting of its product and its distribution to fit the merchandising conditions of tomorrow? By this I mean especially commodities like bakery goods, meats, delicatessen items, and fresh fruits and vegetables.

What are the underlying laws that will regulate the progress of the voluntary chain theory?

How are manufacturers going to handle their sales through the period of evolution where they will largely part company with their specialty men and will develop a new type of merchandising service in association with the different types of retail outlets?

What is the actual difference of cost in the different types of foods between (a) handling established brands with national consumer acceptance, (b) with local consumer acceptance, and (c) with no acceptance except that developed by individual salesmanship?

How can this information be developed so that manufacturers and distributors can reach some measure of fair price control?

What is to be the permanent function of the more than 40,000 salesmen now calling on retail stores and making deliveries direct from trucks? This includes types of com-

modities to be handled and methods of adjusting the sales service to match the convenience of the different kinds of retail operations.

What type of food store is to serve each type of demand for food service?

How are the chains going to develop the permanent personnel that is essential to the full success of the general food stores they are now establishing?

How are the chains going to establish standards which will be so generally recognized that they will automatically control the present tendency to extend competition into delivery and service? In other words, how are they going to keep themselves from following the disastrous paths that led the department stores away from their most prosperous days?

How are the manufacturers and distributors going to get the real facts about the attitude of the hundreds of different groups of consumers toward the different food commodities and the different services that are offered?

In such a period of changing methods and progress toward science there should be no call to drive home the need for an increased measure of truth regarding each function. A very great amount of real information must be assembled if we are to establish the principles that will keep our food markets in order and especially if we are to determine basic principles governing each of the new functions in distribution. The laws of our food markets are peculiarly difficult because production must be organized so far in advance and must develop in the face of unusual weather hazards and then consumption carries so large a human variant because of the influence of speculative impulses on the flow of distributing channels and because of the great changes in volume with the rise or fall in prices.

The problems in the mechanics of distribution are equally complicated, although the different channels are now getting well enough defined to make the controlling principles fairly obvious. The present need is to secure a reasonable measure of agreement on these controlling principles and then progressively develop the facts that will give us some measure of the trends that will apply to each detail of opera-

tions. Perhaps the greatest need of all is to develop the standing of the new profession to where it will be the normal thing to consult a trained engineer.

Every move in food distribution needs an outside viewpoint that should be secured in the same way that we now turn to the lawyer or to the engineer in the physical sciences. Much of this viewpoint is partially available in print, but the average executive is too pressed with his daily problems to go hunting for facts that he probably does not know that he needs and he seldom has a member of his staff competent to substitute for him.

A distinguished college man, now holding an important industrial position, illustrated this to me: "When I was working on merchandising problems at —— I was accused of being theoretical. It is true that I did lack a certain practical viewpoint that would have been of great value, but I did have time for detached studies which gave me an abstract knowledge that I am unable to get now that I am confined each day in a private office. My present dependence must be upon the records of the past and the interpretations of executives who usually feel their safety depends upon conditions remaining as they are."

This need for a disinterested viewpoint of our business operations is so great that one would naturally expect it to be immediately recognized by the corporation executive. Unfortunately we normally think that no one understands our business details except ourselves and we view a call for an outside viewpoint as a confession of weakness.

A great influence now operating in that direction is the progress toward public ownership of a large percentage of businesses. Even this must go through certain preliminary stages before the prejudices of yesterday will give way to a genuine opening of minds. An excellent illustration of this latter trend and a striking example of the necessity for a broader viewpoint was supplied at a recent meeting called to discuss a proposed merger.

Two business groups that had been antagonistic in their competitive methods were discussing an alliance. The majority of the participants were the practical executives who

had waged the competitive warfare. They were thinking only in terms of the conditions with which they had dealt.

There was no true appraisal of the economic principles involved until a great research man was called into conference. In a few sentences he outlined the former competitive position of the two groups and with a few more sentences he pointed out the inevitable trend toward their relationship in the future. From an impersonal position of cold logic he turned the minds of the men in the room to where they saw the proposed move in a totally different light.

Even with growing recognition of the necessity for such a profession, it will not be easy to develop the combination of scientific principles, scientific practitioners, and public recognition needed to quickly supply a real service to business. The science itself is only in process of forming, and there are but few trained men equipped with the practical knowledge needed to make them of immediate value as engineers to determine the laws or as consultants to interpret the laws. The necessity, however, is so great that we may prophesy quite rapid progress. The scientific minds will come together with the business minds and a new profession will be born during the process of establishing some fairly definite trends.

The first of the new distribution engineers will largely be trained economists who are rather long in practical common sense, but to their ranks will steadily be added an increasing number of scientific men working in close understanding with practical experience. The Food Institute feels that its success as an educational factor depends upon ability to do everything possible to speed this development. Our members need this outside viewpoint of their problems. In the beginning this expert service may be able to reach only a few of our problems. But any contribution towards more intelligent control will be of value. Once such a group is clearly recognized and functioning, it will carry within itself the ability to promote an exchange of knowledge that will speed the new science so greatly needed by the delivery function of commerce.

MODERN TENDENCIES IN FOOD DISTRIBUTION[1]

V. H. PELZ
DIRECTOR, EDITORIAL AND RESEARCH STAFF

Following the map analogy suggested by Mr. Corbaley, I want to discuss briefly some of the main elements in the food distribution system of to-day, which correspond to the geological structures, climatic influences, and topographical features of geography, and then let you draw your own conclusions as to the effect which will be produced in the future by the inter-action of these forces on each other.

Perhaps it would be more fitting to speak of the picture puzzle map of food distribution. For I believe that no matter how clearly any of us may have in mind the outstanding features of the map of distribution to-day, we are about as helpless in outlining the details of what that map will be twenty-five years from now as any four-year-old boy would be who tried to put together a picture puzzle map of the United States, without having the faintest idea as to what it would look like when finished.

Even to state what are present day tendencies in food distribution, is to incur the danger involved in prophesying. Yet we know that to-morrow is the child of to-day and yesterday, and we can, therefore, be fairly sure that the elements, forces, and structures in the distribution topography of to-day will be the parts on which the topography of the future will be based.

While it is not possible to draw with accuracy the future map of food distribution, it is perhaps possible first, to define roughly the boundaries of this puzzle map of ours, and second, to identify many of the separate pieces and parts of the map.

Even at the risk of wearing out the analogy it seems to me that the map of food distribution of the future is going to be bounded on one side by large-scale producing (or sell-

[1] Paper read at round table on marketing held jointly by The American Economic Association and The American Farm Economic Association at Washington, D.C., December, 1929.

ing) units; on another side by large scale distributing (or buying) units; on the third side by the need for protecting the long run public interest against undue domination by these large scale producing and distributing units; and on the fourth side our map will be bounded and limited by the ceaseless pressure of consumer demand for lower prices, for better adaptation of product and service to consumer needs, and for the consequent changes in technical processes, and distributing machinery necessary to satisfy or to take advantage of this remorseless consumer demand. How the subdivisions of our puzzle map will fit together is still to be settled, but I believe that all the parts which can now be identified will impinge upon or be based on one or the other of these four "boundaries."

Here then are some of the component parts of this puzzle map of ours. Let us consider first the large-scale producing (or selling) units.

By far the most important of these large scale producing or selling forces must be placed the Federal Farm Board. Its significance is that is has stamped the Government endorsement upon the idea of cooperative marketing, which is in itself a splendid example of the idea of large scale selling. So far the Federal Farm Board has affected to any extent only grain and cotton, neither of which reach the consumer in the form in which they are originally marketed. The Board has hardly begun to touch the field of fruits and vegetables, of dairy products, and of livestock, which to a larger degree are consumed in the home in the same form in which they leave the farm.

We already have outstanding examples of the merchandising power of large scale marketing organizations. One of the most successful of these is the organization represented here to-day by Mr. Brandt. (As an illustration of what I am driving at by putting large scale selling organizations and large scale buying organizations alongside each other, my Christmas turkey was bought from A & P, the largest of the large scale distributing organizations, and had around its leg a tag which indicated that it was sold by Land O'Lakes, one of the largest of these large scale producing or selling units.)

California oranges and walnuts and Massachusetts cranberries are both good illustrations of successful large scale marketing organizations. If the same form of organization under the stimulus provided by the Farm Board, really takes hold of the marketing of other farm products, what will be the effect on prices, on wholesaling and retailing agencies, and on consumption?

The second group of large scale producing (or selling units) now developing is among manufacturers. Merely to mention such mergers as General Foods, Standard Brands, the Glidden-Durkee group, Carnation, the Gold Dust menagerie, National Dairy Products, Borden, General Baking etc., is to indicate the importance of this picturesque and relatively new development in food distribution. Nor does it need a lively imagination to see arising from such a consolidation movement questions of the most serious import to producers, distributors and consumers alike.

Of lesser importance in total volume but nevertheless significant because of the importance of the canned goods industry to the grocery business, is the growing restlessness among the 2,500 canners of the country over the unstabilized conditions of production and distribution in the canned goods field. Unsatisfactory conditions in this section of the food industry have come about chiefly through two causes; the lack of statistical information on which production control can be based, and the existence of a large number of financially weak producers whose need for cash annually throws a monkey wrench into the already creaky machinery for marketing a manufactured product which is limited to one turnover per year or less. The success of the California spinach and asparagus packers in devising a method for handling a surplus has been a shining goal in the eyes of canners of other commodities. There is already on foot, though it has not yet progressed far beyond the conversation stage, a movement to develop some means of similarly controlling, through centralized selling organizations, the marketing of the canned goods pack.

This growth of large scale producing units on the one hand and large scale distributing units on the other hand might not be as portentous if it were confined only to the

so-called grocery field, but there is going on a pronounced development of "food" stores, carrying practically all types of food products, just as the department stores are the successors to the old drygoods stores. The convenience to the housewife of being able to buy (either in person or over the phone) meat, fruits and vegetables, bakery goods, and delicatessen items at the same store where she makes her "grocery" purchases, is resulting in the rapid development of general food stores. For reasons which would require too much time to detail here, it is highly advantageous for chain systems particularly to procure the bulk of these allied food lines, many of which are perishable in nature, primarily from a single source. This fact at once constitutes a potent reason for the growth of large scale producing (or selling) units to match the buying power of large scale distributing units such as chain stores.

The further fact that the physical machinery necessary for the economical distribution of the five great groups of food products—package groceries, meat, fresh fruits and vegetables, bakery goods, and delicatessen items—differs decidedly in each case, is likely to have a profound influence on the setup of the manufacturing or producing organizations in each of these basic commodity groups. There is already reason to believe that there has not so far been adequate recognition of this influence by some of the food mergers.

Acting as a connecting link between large scale producing (or selling) units and large scale distributing (or buying) units are those amalgamations which have taken place between great manufacturing and great merchandising organizations. The most conspicuous example so far is the way in which the group interests headed by Mr. Morrow of Gold Dust has reached out for a controlling interest in the United Cigar Stores. Another illustration is the tendency among outstanding chain store groups to own their own baking plants outright. A third illustration is in the community of interest between a group of chain stores and the United States Dairy Products Corporation through important stock holdings in each by the National Food Products Corporation. Still a fourth illustration, though not nearly

as clear, is the seeming desire on the part of the meat packers to so modify the Packers' Consent Decree as to permit them to go into the chain store business.

With such a sketchy outline of the growth of large scale producing (or selling) units, let us see the extent to which they are paralleled by large scale distributing (or buying) units. Whether large scale buying came before large scale selling is a futile question to argue, but there is little doubt that the growth of large scale units on either side is a sufficient cause or excuse, depending on our viewpoint, for the growth of large scale units on the other side.

Most conspicuous among large scale distributing (or buying) units are of course the chain stores. Sixty-five thousand retail chain outlets, owned by 800 companies, do at least 35 per cent of the total grocery business of the country. Forty thousand out of these 65,000 stores are as a matter of fact owned by 12 companies—a tremendous concentration of retail purchasing (distributing) power into large scale units.

In addition to the centrally owned chain stores, there are about 60,000 independent retail grocers now grouped into some 400 voluntary chains doing 20 to 25 per cent of the total grocery business, and thus constituting another tremendous centralizing of our distributing organization. This means that between 55 and 60 per cent of the total grocery business of the country is now controlled by some 1,200 buying headquarters; a most significant contrast to the prewar state of affairs when any manufacturer wanting a national distribution felt it necessary to contact a large proportion of 350,000 individual retail grocers.

As corollaries of this massing of retail units for buying purposes we have the decline of wholesalers and brokers. More accurately perhaps we have a realignment of the agencies by whom the wholesaling functions are performed. Chain stores, whether voluntary or centrally-owned, bring about a consolidation of wholesale and retail functions—which from the economic standpoint perhaps constitutes their outstanding significance.

On the third side, this map of ours is limited by the obvious need for protecting the public against domination by

these large-scale buying (or distributing) and selling (or producing) organizations.

The first of the protective agencies are the Sherman Act and the Clayton Act. Perhaps this part of our picture puzzle will have to be trimmed considerably before it can be made to fit into our new map but it is nevertheless one of the key parts to be considered.

The Federal Trade Commission is still another governmental body which must be considered, for through its contacts with business and through the influence it exercises over business practice, it will have a profound effect upon the structure which business erects to provide the food distribution service of the future. Even though its legality is still in question, the influence of the Trade Practice Conference idea has had far-reaching effect. The fact that the Federal Trade Commission has been given the power to make inquiry into the question of price maintenance is another element in the puzzle. To what extent must we re-study the economics of price maintenance—which no one has yet fully elucidated anyway—in the light of the growth of large scale buying and large scale selling units? A good many manufacturers are already flirting with the idea that the ownership of their own retail outlets may be after all the most workable answer to the whole question of control of prices and especially if such ownership should bring in its train other effects favorable to the profit and loss statement.

Still another part of our picture puzzle is the attitude which the courts will take toward cooperative organizations of retailers. Is it consistent for the Government to turn thumbs up for the price-making activities of individual farmers when these are carried out by cooperative farming organizations, and then to turn thumbs down on cooperative marketing activities of individual retailers?

Still another section of our map contiguous to this boundary is the changing public attitude toward large scale business organizations and toward the consequent danger of monopoly. We may have fears of monopoly to-day but they are not caused by the same kind of ghosts as were our fears of a generation ago. Partially this is due to the fact that stock ownership of these large scale organizations is being

diffused so widely. Partially, also, it is caused by a better understanding on the part of the public of the fundamental economics involved. A good many people are beginning to realize, for example, that from the profit-making standpoint cash-and-carry retail stores may be advisable, especially when the cash-and-carry idea lies at the foundation of a group of say, 18,000 stores. But there is also coming about a good deal of questioning as to the social economics involved. Is it or is it not wasteful for 300 housewives to spend the time and energy required in trotting to a grocery store and back again with their arms loaded? The only economic justification for the cash-and-carry idea is the extremely low money value which is at present placed upon the time and energy of the housewife, and as this is changed through the greater participation of women in industrial and commercial activities, there is bound to come about a revaluing of the economics of cash-and-carry retailing.

The way in which these three elements—large scale distribution, large scale production, and governmental relations to business—intertwine, finds a splendid illustration in the packers' consent decree. Ostensibly, we have large scale selling (producing) organizations of packers, petitioning the Government to permit them to go into the large scale buying (or distributing) business—the ownership of retail stores. Men who are familiar with conditions both on the meat packing side and the chain store side doubt seriously whether this is really what the packers want. Many of these men say that the real objective of the packers is the removal of all legal restrictions which would prevent them from developing such close and intimate business relationships between themselves and large distributing units as would give them preferred outlets for their products and lower costs of distribution. This is precisely what many of the small packers have done and there is little doubt but what the large ones—hampered by the consent decree—have been casting envious eyes over the fence which now keeps them out of the retail field.

The fourth boundary of our map is consumer demand, though logically this might be called the foundation of all the changes taking place, rather than merely one boundary

of them. Even though the analogy breaks down here, it is still possible for us to point out a fourth group of developments in present day food distribution, all of which have their common source in the continuous effort of business men to invent new technical processes, or to devise new forms of organization for the distribution of food, or to provide new types of service facilities for the convenience of the housewife. All these activities are caused by the ceaseless consumer demand for lower prices, by the constant searching for new ways of performing household tasks, and of new conveniences to lighten the daily kitchen routine.

Of all these developments, the most interesting in its possibilities is that of frozen foods. The freezing process has already been applied profitably in the fish business and to a lesser extent in the freezing of fruits and berries. The basic experimentation is now under way for the adaptation of the quick freezing process to meat, though the equipment and merchandising problems have hardly yet been tackled. It is not at all outside the bounds of probability that the quick-freezing process may eventually be applied to fresh vegetables.

What this development may mean to the whole structure of retail distribution you can readily imagine. For if these perishable products can be so processed at the point of production as to be delivered to the kitchen through ordinary retail stores in the form which is best adapted to final consumption in the home, there are bound to be profound changes in the present organization of the food supply of the country. The very fact that processing will have to be done on a large scale and the fact that refrigeration equipment, both in the home and in the store, will have to be provided on a large scale, means that the marketing of such quick-frozen products is likely to be most successful when controlled by large scale units.

Efficient household refrigeration, efficient beyond that now enjoyed by the average household, is a necessary corollary of any such developments in the quick freezing of food products but this, too, is a technical development which may be expected to come as rapidly as economic factors justify.

The changing conditions of American life, primarily those

which have led to its urbanization, have been fundamentally at the bottom of the whole tendency toward the packaging of food products. Packaging, with its corresponding uniformity of product, means the possibility of distributing organizations which function almost automatically and hence exercise far-reaching effects on the structure of distribution.

The desire of the housewife to buy all her food products from one store, already mentioned, is another of these consumer influences which is hastening the reorganization of our distributing machinery.

The drive for lower costs of course finds expression in manifold ways throughout the entire merchandising organization, but one aspect of this searching for lower costs needs especial emphasis, i.e., the Louisville Survey. Despite the fragmentary character of the information about it which has trickled out of Washington so far, most of you are rather familiar with the general nature of the study. But one fact about the Louisville Survey has not received adequate attention, i.e., the fact that it constitutes the first thoroughgoing attempt to lay the foundation on which can be erected the structure of cost accounting theory as applied to wholesaling and retailing operations. Cost accounting for distribution is to-day at about the same stage of development as cost accounting for production was a generation ago. It is rather doubtful whether there are one hundred food manufacturers in America who have made one-tenth the progress in cost accounting for their sales operations that they have in cost accounting for their manufacturing operations. There are not half a dozen wholesalers in America who have any more accurate way of knowing whether a given line or item is profitable than the method of comparing its gross margin with the average for the entire business. It is safe to say that there are even fewer retailers—with the exception possibly of the chain stores—who have any accurate idea as to the relative profit of the several hundred items they carry in stock. However important may seem the immediate results of the Louisville Survey, they are trifling in comparison to the impetus which this survey will give to the development of cost accounting theory in distribution.

To summarize, then, we have the following as some of the

constituent parts out of which the new structure of food distribution is to be built:

The influence of the Federal Farm Board; mergers by manufacturers; centralized selling organizations among canners; the growth of general food stores in the place of grocery stores; mergers between manufacturers and merchandising organizations; chain stores; voluntary chains; the anti-trust laws; the Federal Trade Commission; stock ownership by the public in manufacturing and distributing organizations; the new attitude toward large scale business enterprises; the packers' consent decree; the development of frozen foods and household refrigeration; the increasing tendency toward packaged food products; the Louisville Survey.

It would be easily possible to mention a score of other developments each of which will constitute a section of this new map of food distribution. To do so would only confuse rather than clarify our discussion.

Out of this aggregation of forces and structures—or geographical regions if we are to continue our map analogy—will come the food distributing machinery of 1950. It is likely that this new machinery will be totally unlike anything which we have as yet visioned. This vast structure to-day is complicated but it is certain that these complications will be met during the next few years by a determined effort to simplify the commercial relationships which hold it together, to the end that the "commercial revolution" which seems just to be starting may work itself out through the application of equally profound engineering principles to a conclusion as satisfactory both to producers and consumers as did the "industrial revolution" of a century ago.

SOME SOCIAL AND ECONOMIC ASPECTS OF RURAL ELECTRIFICATION[1]

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I

Why An Interest In Rural Electrification?

The subject of rural electrification has, during the past few years, come forward as a topic for discussion and action. It is of particular interest from four points of view, namely, (1) Its influence on agricultural efficiency, (2) Its significance as a labor-saver in the home, (3) Its influence on the whole plane of living of rural folk, and (4) Problems involved in promoting electrification. It is the first three of these topics that I wish to discuss in this paper.

II

Extent of Rural Electrification Now

It is estimated[2] that the American farmer uses approximately sixteen billion horse power of energy in his operations each year. Of this, 80 per cent is used directly in the production of crops and 20 per cent in the various operations about the farm, including care of livestock.

Classifying the total according to sources of energy it is estimated that in 1924, 61 per cent was from animal power, 16 per cent from tractors, 4 per cent from motor trucks, 12½ per cent from stationery engines, 1 per cent from windmills, and about 5.5 per cent from electric motors. About 17 per cent of the total power requirements have been classified as "heavy stationary" (operations requiring more than 5 horse power) and 12.5 per cent as "light stationary." It is in these two groups, making up nearly 30 per cent of the total, that electrification has real possibilities. Assum-

[1] Paper read at the 20th annual meeting of the American Farm Economic Association, at Washington, D.C., December, 1929.

[2] Kinsman, C. D., "An Appraisal of Power used on Farms in the United States." U.S.D.A. Bulletin 1348. 1925.

ing that the 5.5 per cent already electrified is wholly in this group, we have already approximately 18 per cent of the farm operations electrified to which it is readily applicable.

I have not seen adequate figures showing what per cent of our farms are now supplied with electricity. However, a survey by the Rural Electric Light Association showed 388,024 farms in 31 states having service from high tension lines on January 1, 1929. On the basis of this survey, it was estimated that from 450,000 to 550,000 farms were on that date receiving service from distribution lines—somewhere in the neighborhood of 13 per cent of the total number of farms.[3] If as many more have individual unit plants the proportion would be something like one farm in four.

In Wisconsin it was estimated in 1926 that 20,000 farms or 11 per cent of the total then had electricity.[4] In Nebraska over 13,000 farm homes, about 10 per cent of the total, had electricity in 1928.[5] Something over 80 per cent of these were reported to have individual farm plants while the rest were supplied from central stations. In California a total of 210,000 "rural consumers" received electric service in 1925, and 48,460 were reported to be receiving power.[6] The latter figures are difficult to interpret because of the large number of sub-urbanites included as "rural consumers." It is probable, however, that most of the 48,460 reported as receiving power were farmers. That would represent about 35 per cent of the number of farms reported that year.

It is sometimes said that not over 30 per cent of all farms of the United States can ever be supplied from central stations because of the high cost of building power lines. Nevertheless, a very large number of the remainder are potential customers for unit farm outfits once the real possibilities are realized and the necessary buying power is available.

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[3] C.R.E.A. News Letter, No. 6, P. 3, July 8, 1929. In the same article it is estimated that there are as many as 800,000 farms equipped with individual lighting plants.

[4] Duffee, F. W., in "What About Rural Electrification?" Proceedings of the Farm-Electrical Conference, Chicago, May 12-13, 1926. Published by Agricultural Publishers Association.

[5] Brackett, E. E., and Lewis, E. B. Unit Electric Plants for Nebraska Farms. Neb. Exp. Sta. Bul. 235. 1929.

[6] Moses, B. D. Electrical Statistics for California Farms. California Experiment Station Circular 316, 1929, p. 7.

III

Influence of Electrification on Rural Efficiency

Farm operations which can readily be electrified may be placed in three groups. First, there are those heavy operations which are now done by horse power or by steam or gasoline engines. Such are threshing, corn shredding, feed grinding, hay chopping, pumping for irrigation, or operating milking machines. Second, certain operations which are very commonly done by hand. This includes the operation of grindstones, cream separators, the occasional churn, fanning mills for cleaning grain, grain elevators (assuming grain would otherwise be shoveled) and pumping water for farm use. Third, there is a long list of uses which are clearly in neither of these classes. Here are incubators, barn ventilators, barn lighting, lighting of hen houses, electric refrigerators for dairy products, fruits, etc.

In many of these operations the outstanding characteristic of electrification is the degree to which the operations may be made automatic. This statement is not particularly true of those operations in the first group above which will naturally require one or more attendants. Such are threshing, shredding, and the operation of milking machines. Here advantages, such as there may prove to be, lie in greater convenience, greater freedom from trouble, and steadier power. In such operations as feed grinding, however, it is possible to make arrangements for automatic feeding of the machine. Since under that plan little human labor is required a small grinder can be used which will make possible the use of a small and inexpensive motor. Here there may be a substantial reduction in the amount of man labor required to grind a given amount of feed.

In the case of barn lighting there is also a possibility for greater efficiency. Even though farm work-days could be somewhat shortened, there are many times in rush seasons and in the winter months when chores must be done by artificial light. Men who have electrically lighted barns and farm yards have variously estimated increased efficiency at from 10 to 15 per cent.

In the second group are a lot of jobs that are irksome, uninteresting, and likely to be done as over-time. How many

memories of boyhood days on the farm are marred by the hours spent turning the grindstone while father held the sickle during noon hours, when reading a new magazine, taking a nap, or even playing ball were alternatives; again, there was the cream separator—fifteen minutes of drudgery that came late in the evening, following a hard days work, often after other members of the family had already finished their day's work. The very labor of rigging up a motor to do such a job, would fascinate the average American farm boy.[7]

Here again electrification should not only lead to the elimination of a large amount of drudgery but to an increase in the accomplishments of a given amount of human energy. In many instances this will mean that the farm boy can take over a job formerly requiring one or more husky men. Thus one man reports that it took four good men to handle and bin the grain threshed on his farm. After installing an electric motor and an elevator, a boy was able to do the work. This man estimated an actual saving of $61.00 a year after allowing liberally for various cost items.[8] In the meantime the motor and elevator are available for recleaning operations and for moving moist grain from one bin to another to prevent heating. The latter job is becoming of particular importance with the increased use of the combine in the humid sections of the country and has an important bearing on the problem of "orderly marketing."

In the third group of items it is again difficult to evaluate the results. An electrically operated ventilator in a dairy barn is not costly to install or operate. Its value is hardly to be questioned. An air-moving fan in hot weather would doubtless add greatly to the comfort of milkers with relatively little cost. Returns will doubtless ultimately take the form of dollars and cents on any up-to-date farm but neither the monetary nor the psychic benefits can be measured.

The matter of relative costs of using electrical equipment and power as compared with that now in use is in part a problem of building up a load sufficient to carry necessary

[7] Since writing the above my attention has been called to a study of uses made of electricity on Minnesota farms. (W. L. Calvert in Farm Economics (Cornell) Oct., 1929, p. 1171). Among the first five operative uses listed are cream separating, pumping water, farming grain, and running an emery wheel or grindstone.

[8] Arbogast, Ralph, in "What About Rural Electrification," Op. Cit., P. 11.

overhead costs of installation. Although I do not wish to burden you with cost statistics, a few figures will be of value. Various estimates and experiences place the costs of building lines and installing transformers for an average rural consumer at from $300 to $500. A cost of $400 has been estimated to mean an annual charge of $70. This includes interest on investment, taxes, depreciation, and operation.[9] It amounts to $5.83 per month. If this overhead cost is to be absorbed by a low current consumption, the line would obviously be unprofitable or the current too high for use. Thus the use of but 20 kilowatt hours a month, a likely average if the only use is for electric lights, would mean a cost of 29 cents per kilowatt hour for overhead alone. If the average consumption can be raised to 100 kilowatt hours the overhead cost falls to 5.83 cents. Adding that to a 4 cent rate and the total becomes 9.83 cents. At that rate use for power and light comes within the range of feasibility.

The question may well be raised as to whether the farmers should be asked to pay the entire cost of such extension during the period of introduction. It may well be that power companies can work out means of financing such extensions and perhaps even make introductory rates. Even so the cost will be high, for installation will involve an additional initial cost of several hundred dollars for wiring farm buildings and the cost of such electrical equipment as may be needed.[10]

The problem of load-building involves also such matters as devising new equipment and new connections for present equipment, some remodeling of old buildings or replanning of new. In part, perhaps, it involves, also some educational work designed to develop a more insistent and general demand for electrification among farmers themselves.

I might summarize this section by saying that while electrification very definitely promises more accomplishment from a given amount of human energy and thus gives added benefits in terms of net money income,[11] its greatest benefits,

[9] Meacham, E. R., in "What About Rural Electrification?" Op. Cit. P. 22.

[10] One writer points out that it is now a common practice to give to certain classes of customers rates which are below the total cost. Zinder, Hanina. Problems of Rural Electric Service: Rural Rates and the Financing of Rural Line Extensions. Jo. of Land and Pub. Utility Econ. 5:1:81. Feb., 1929.

[11] Of course any increase in output per man will further reduce the man-requirements of American Agriculture and in that way add to the problems of relative over-

even in the strictly production phase, may prove to be in that intangible thing often spoken of as the plane of living, for work is a real part of living, and it matters much whether farm work be pleasant and interesting or dreary and dull.

IV

Significance of Electrification as a Labor-Saver in the Home

There is probably no one mechanical improvement that may so completely transform the farm home as electrification. Electric lights, the electric washer, the vacuum cleaner, are things that come to mind as most likely to lighten toil and make the home attractive. But one should not overlook the waffle iron, the percolator, the electric refrigerator, the electric sewing machine, the radio, the electrically controlled furnance, and, where current is cheap enough, the electric heater and kitchen range.

None of the above are involved in what is discussed as the farm power problem. But the electric washing machine and the vacuum cleaner alone will actually lighten the physical labor of the home to a far greater extent than will any of the farmstead applications of electricity lighten farm work. Even the electric light means elimination of the drudgery of cleaning and filling lamps. The endless jobs of the farm home-maker have done much to create a need for hospitals and have done their share toward filling many an early grave. As for the farm girls—if drudgery has driven boys to the city it has driven away as many girls and has made countless others wish they could get away. Certainly nothing can be done that will do so much to keep the more capable young folks on the farm as to brighten the home by making electricity available.

V

Influence of the Decentralization of Industry on the Promotion of Rural Electrification

A development that seems in prospect, and that has an important bearing on rural electrification is the decentrali-

production. This aspect is probably not serious but must be kept in mind by those considering any positive or negative action relative to farmers and farming.

zation of industry. This is one of the developments that may arise out of the coming of super-power, which is making dependable twenty-four hour electric service available to many a small city which was previously poorly served. It has been estimated that such electrical service has become available within the past five years to four thousand towns and villages formerly without it.[12] Electrification of these towns and cities has, of course, made the service available to many rural communities. At the same time, however, it has made such towns eligible for the location of industrial plants so far as electrical power is concerned.

There seems to be no pronounced tendency toward decentralization of industry although many new industries and numerous branch plants are being established in relatively small cities. A study of the location or relocation of industrial plants in the United States and Canada in 1926 and 1927 shows,[13] that "while the larger cities are still getting the majority of all new plants of all kinds, the tendency in favor of smaller cities is rather pronounced. One very significant fact is that in the South Atlantic territory forty per cent of the total gains in all plants is to be found in communities of under 10,000 population. An analysis of the relocations in nine geographical areas indicates that, in most of the areas, the preponderant movement was from the larger to the smaller cities."

The several types of industry of course, give different reasons first place as explanations for plant location. Markets, labor, transportation, and materials, are most frequently mentioned. Power and fuel usually ranked from third to seventh in the list of reasons given. High rents, heavy taxes, and congested streets in the big industrial centers are doing their parts in causing industry to seek other locations. Good roads, available power, nearness of raw materials are attracting them to smaller cities. It has been suggested that standardization and interchangeability of parts may be another development that will make scat-

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[12] "Industrial Development in the United States and Canada." A cooperative survey by the Civic Development Committee of the National Electric Light Association and the Policyholders Service Bureau of the Metropolitan Life Insurance Company, 1929.
[13] Industrial Development, Op. Cit., P. 6.

tered manufacturing units and conveniently located assembling plants practicable.[14]

Obviously the location of an industrial plant in a small city brings with it a train of other developments. Some new families are immediately attracted to the city. Some workers shift employment from old jobs to the new. Doubtless some persons find employment who were previously only partly employed. Wages are likely to rise somewhat, thus to some extent, raising costs of production, but creating at the same time additional pressure for labor saving devices. Opportunities for employment are offered to the surplus labor of surrounding farms. Moreover the additions of say, two hundred families of industrial workers to a community, may bring with it a complement of trades and service establishments or enlarge the business of those already established. Grocery stores, meat shops, drug stores, shoe repair shops, restaurants, garages, filling stations, will gradually find their places. Moreover some forms of agriculture are quite likely to be stimulated. There are at once increased requirements for milk, fruits, vegetables; moreover good roads make homes as far away as five or ten miles available to workers. Every such development will therefore tend to bring electricity to the gateway of a large number of farmers living in the fairly well-settled areas about a small industrial city.

Two other results are likely to follow. One is the change in the economic structure of the region from 25 to 50 miles about a factory town. It is likely to make available more and better shopping districts, theaters and libraries. Moreover, insofar as decentralization of industry and electrification of agriculture go together, there will be readier shifting from rural to urban occupations and vice versa among the workers of town and country. New industrial plants should in particular draw off any labor released by the application of labor saving devices on the farm. Perhaps Kropotkin's vision in "Fields, Factories, and Workshops" was not so fanciful after all!

In conclusion I am inclined to agree with Mr. Tripp when he says:

[14] Guy E. Tripp. Electric Development as an Aid to Agriculture, P. 58. Knickerbocker Press. New York. 1926.

"If for much more practical reasons (than owning an automobile) the majority of our farmers should adopt the general use of electrical power on the farms, would it be an extravagance which they could not afford? I do not think so. I think it would tend to so improve and develop the man himself that out of the additional cost would arise a profit from his greater alertness and efficiency."[15]

We should, of course, keep in mind the various other changes which follow. The need for rebalancing of occupations as agriculture finds itself in need of less and less man power; the fact that industrial development may be desirable in rural areas to drain off those elements of rural populations which are better adapted to routine factory operations than to the mechanized and electrified independent units known as farms with their demands for diversity of technical and business skill. Merely making electricity available will not be enough. Farming will have to be sufficiently profitable to attract the kind of men who can succeed with modern methods and equipment.

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[15] Tripp, Guy E. Op. Cit., P. 8.

PROBLEMS INVOLVED AND METHODS USED IN PROMOTING RURAL ELECTRIFICATION[1]

S. H. McCrory,

Bureau of Public Roads

In 1922 the use of electricity in the city home was general, and even the humblest homes could be supplied with this service at nominal cost. Many labor-saving devices had been developed which were in wide use in homes supplied with electricity. At that time few farm homes had electric power available so that use could be made of equipment which was extensively used in city homes, although in many instances there was urgent need and keen desire for such service.

Farm organizations recognized the demand and need for rural electric service and made efforts to secure such service. At that time, however, there was a widespread belief among representatives of the electric light and power industry that rural lines would be unprofitable and the issue promised to become exceedingly bitter. Both groups saw that such a situation would be highly undesirable and conferences were held between representatives of the farm organizations and the electric utilities at which the situation was considered, and it was agreed that before a solution equitable to both interests could be arrived at, it would be necessary to determine the facts in regard to rural service. As a basis for such a study, the two groups agreed to the following statement:

> The demand for rural electric service has produced an acute situation for the electrical industry due to the new and undeveloped state of the use of electrical energy on the farm. To develop the use of electrical energy on the farm the following suggestions are made:
>
> 1. The problem from both angles is:
>
> (a) How service can be supplied to the farmer? and what is involved in its establishment?
>
> (b) How can service be utilized by the farmer so that it will be profitable to him?

[1] Paper read at the 20th annual meeting of the American Farm Economic Association, at Washington, D.C., December, 1929.

2. It is believed that controversy is undesirable and that by cooperative efforts between the electrical and agricultural industries the problem can be solved to the best interests of all.

3. It is proposed that a cooperative organization representing these interests be formed to study the problem and to ascertain and put in form available for the use of anyone interested, the following:

(a) The various methods by which electrical energy can be profitably utilized on the farm, including research studies of equipment characteristics as well as methods.

(b) The facts regarding the transmission lines and electrical equipment needed to furnish the farmer electric service comparable in quality with that already supplied in the industrial field.

4. The purpose of this proposed work is to ascertain facts. No selfish propaganda of any interest or class involved shall be allowed to enter.

Accordingly, in the summer of 1923, a committee known as the Committee on the Relation of Electricity to Agriculture was formed. Membership on the committee was drawn from the American Farm Bureau Federation, the National Grange, the National Electric Light Association, individual plant manufacturers, the American Society of Agricultural Engineers, and from the United States Departments of Agriculture, Commerce, and Interior. Funds were supplied by the National Electric Light Association and the American Farm Bureau, and arrangements were made for a director to carry on the work of the committee. The committee was fortunate in securing Dr. E. A. White, an agricultural engineer of wide experience to serve as director.

At its first meeting the committee formulated a program and planned to secure as quickly as possible the desired information. To ascertain the possible applications of electric power to agricultural uses it was determined to construct experimental rural lines in as many States as possible. This was to be accomplished by the formation of State committees consisting of representatives of farm organizations, public utilities, the agricultural colleges and other interested groups. This committee decided upon a program, arranged for necessary experimental facilities and equipment, and for the studies necessary to secure the desired information. The first of these experimental lines to be established was the Red Wing line near Red Wing, Minnesota, under the auspices of the Minnesota committee. This line had been nearly completed and was functioning at the

time the national committee was organized. It consisted of a rural line serving a group of farms that had not previously been supplied with power. These farmsteads were wired and electrical equipment of many kinds supplied. The effect of this equipment on farm operation and returns was studied.

Within a year after the national committee had been organized, State committees had been formed in ten States and work started. Arrangements had been made for the U. S. Department of Agriculture to make a study of power used on farms in the United States, for the U. S. Department of Commerce to secure information in regard to the use of electric power in agriculture in foreign countries, and for the electrical utilities to make a survey to determine the extent of the use of electric power on American farms. As the State committees were organized it was suggested to them that they study their local conditions and develop a program suited to the existing conditions. As much information as possible in regard to what other States had done was made available for their use. In general, to the State agricultural colleges was delegated the responsibility for the organization and direction of the programs of the State committees. The utilities companies gave financial aid to this program without specifying how the studies should be conducted. Many manufacturers loaned or donated equipment for experimental use. This work has been organized in 23 States and has resulted in the development of a considerable number of men who have aided materially in devising equipment for farm use and have interested many of the members of the college staffs in the undertaking.

Since the work was begun in 1923, there has been a great change in the status of the use of electric service on farms in the United States. In 1924 a survey by the National Electric Light Association showed that 166,159 farms in the United States received high-line service with reports from Alabama and Rhode Island missing. The Rural Electric Service Committee of the National Electric Light Association reported that on January 1, 1929, of 31 States having a total of 3,911,024 farms, 388,719 were supplied with

high-line service. It has been estimated that on that date a total of 500,000 farms in the United States were supplied with high-line service, and that at least 300,000 farms were supplied with current from individual electric plants.

The attitude of the utilities toward the rural load has changed greatly since the work was started. More than two hundred power companies now have men devoting their time to rural development. Several companies have rural expansion programs involving a million dollars a year, and there is widespread interest on the part of utilities in the rural load. In New York State it is reported that 800 miles of new rural line were built during 1929 and that the number of consumers increased 4,200, making the total number of farms in the State having high-line service, 52,000. It was reported in the daily press recently that in Michigan 1,500 miles of new rural line were built in 1929, and that at least 20,000 farms would have high-line service by January 1, 1930, an increase of 7,500 farms in one year.

On January 1, 1929, there were seventeen States with over 10 per cent of farms having high-line service. In the West, Washington had 46.9 per cent; California, 46 per cent; Utah, 39 per cent; Nevada, 31 per cent; Idaho, 27.3 per cent; and Oregon, 20.5 per cent. East of the Mississippi the percentage of farms having high-line service was as follows: Wisconsin, 10.8 per cent; Ohio, 12.5 per cent; Pennsylvania, 13.5 per cent; New Jersey, 39.7 per cent; New York, 25.9 per cent; Rhode Island, Connecticut, Massachusetts, New Hampshire, Vermont, and Maine, 23.7 per cent.

From a consideration of the agricultural characteristics of these States it is evident that in the West irrigation pumping affords the best foundation for the development of a rural load. Poultry raising, dairying, vegetables and fruit production are the types of agriculture in the East best suited to the development of a rural load. It is interesting to note that the percentage of farm tenancy is low in all of the 17 States, and that in all of these States except New Hampshire and Ohio, the farm income is above the average for the United States.

There is not a great deal of data available in regard to the increase of power used on farms. In the Sixth Annual

Report of the Director of the Committee on the Relation of Electricity to Agriculture the following data obtained from power companies are given:

In Alabama, rural customers, 70 per cent farmers, used per farm per month, 32 k.w.h. in 1924, as compared with 73 k.w.h. in 1928.

In Idaho, the average per farm per month was 114 k.w.h. in 1924, compared with 146 k.w.h. in 1929.

In Wisconsin, the Rural Lines Committee of the Wisconsin Utilities Association report an average consumption per farm per month for the State as follows: 16 k.w.h. in 1923, compared with 50 k.w.h. in 1928. The Wisconsin Power & Light Company reports 36 k.w.h. used per farm per month in 1924 compared with 50 k.w.h. in 1928.

The total electrical energy used in the United States in 1928 was 69,700,000,000 k.w.h. Director White estimates that 1,335,000,000 k.w.h or less than 2 per cent of the energy produced was used on farms in 1928. The consumption of energy was divided as follows:

California	1,000,000,000 k.w.h.
Remainder of Country	260,000,000 k.w.h.
Individual Electric Plants	75,000,000 k.w.h.

It has been demonstrated that on certain types of farms a load can be developed that will give the farm the advantage of a low energy rate. Much difficulty has been encountered in securing information in regard to the financial return to the farm. Five farms on the Red Wing project, Minnesota, after allowance was made for depreciation on loaned equipment, showed an income as follows:

1924	$ 6,876.70
1925	9,769.85
1926	10,630.70
1927	12,446.62

How much of this is due to the use of electric power and how much to variation in price of crops has not been worked out.

The character of the engineering research relating to electrification of agriculture is changing, and coming more and more to deal with specific technical problems. The ex-

perimental line studies are pretty well completed with the exception of one or two States. There is also in progress a gradual transfer of the research work from the State Committees to the Agricultural and Engineering Experiment Stations, and as this change is being made, there is also a shift from funds furnished by the electrical industry to regular station funds. To date the investigations have centered almost entirely about the farmstead, and there has been little endeavor made to apply electric power to field operation. In 1924 power amounting to approximately 16,000,000,000 horse power hours was used on farms in the United States, of which electricity furnished 5.5 per cent; animal power, about 61 per cent; tractors, 16 per cent; stationary engines, 12.5 per cent; motor trucks, slightly less than 4.5 per cent; and windmills slightly over 1 per cent. A large part of this power was used in field operations. Each year mechanical power on farms is being used in increasing amounts. To-day field operations on farms are the only set of operations in which large amounts of power are used to which electric power has not yet been successfully and profitably applied. The potential load is so great that it seems certain that in the near future investigations having for their object the increased use of electric power in field operations will be undertaken in a comprehensive manner.

The increased use of electricity on the farm is bringing a new group of economics problems, on which work is urgently needed. Just as it was important to get the facts in 1923 and 1924 about the possibility of using electric power in farm operation, it is now desirable to get definite information about the effect of the introduction of this type of power on the farm on the farmer's income. The farmer must be given information on which to plan his program and to guide him in the purchase of equipment. He needs this information now while farm practices are being formed—not after practices are standardized. Many groups are becoming interested in the farmer as a sales prospect for electrical equipment, and as I see the situation it is in the interest of both the farmer and those supplying electrical energy to prevent the farmer from being over-sold or generally supplied with equipment that will be unprofitable.

NOTES

PART-TIME FARMING IN MASSACHUSETTS

The study of part-time farming was undertaken by the Massachusetts Agricultural College both in order to gain a better knowledge of this type of agriculture and to determine its effect on land utilization and regular farming in the state. There are in Massachusetts a large number of people, particularly industrial laborers, who practice agriculture on a part-time basis. Although this practice has been present to a certain extent in the state since the early period of settlement, the indications are that during the last decade or two it has gained considerably both in the area and the number of persons involved. Many factors have been responsible for this development, but of special importance has been the growth of good roads and motor transportation, which enable the operators to travel greater distances to and from their work.

In spite of the rapid growth of this type of farming in many industrialized areas of this and other states, very little is known as to the extent of its development, and as to its bearing on regular agriculture. The information on agriculture supplied by the United States census covers only those enterprises which come up to a certain minimum size or income. Only a small portion of part-time farming reaches this census minimum. Hence, in the regions where part-time farming is practiced extensively, a discrepancy will be found between the actual condition of agriculture and that described by the official figures.[1]

The data for the study of part-time farming were obtained by means of a survey in three different areas of the state. The areas for investigation were selected with a view to obtaining the picture of part-time farming in localities with varying conditions of agriculture, industrial employment, and nationality of operators.

In the central part of the State a complete survey of agriculture was made of the town of Holden, which was selected as coming close to a representative or model community for the state from the standpoint of extent of part-time farming. Information was obtained as to the extent of agricultural activities and the occupation of operators, for families or persons practicing any kind or any amount of agriculture. This part of the survey thus included both regular farmers and part-time farmers.

In the northeastern section of the State the investigation was carried on in four towns situated around the city of Lowell, and in the southeastern section in four towns between Taunton and Fall River. The purpose of the investigation in these two areas was primarily to get a picture of the economic and social set-up of part-time farming as practiced by operators engaged as industrial and other laborers. The schedule used with these operators called for a history of their occupations, date of settlement on the land, extent of farming operations, living conditions, and earnings, both from farming and outside employment.

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[1] The 1930 Census of Agriculture will call for some information also from small agricultural enterprises not qualified to be classified as farms.

The complete house-to-house survey of the town of Holden indicates that there are only 66 regular farmers in the town, but 519 part-time operators.[2] Although the majority of the latter are only small producers, limiting their agricultural activities to the needs of their families in vegetables, poultry, and dairy products, they contributed almost one-half of the total value of agricultural products raised in the town. Of these 519, more than half, 61 per cent, to be exact, were industrial or other laborers. Most of these derive a substantial share of their income from their part-time farming, and this share grows in importance in the periods of slack employment, when the operators tend to expand their agricultural activities.

Prior to their entering part-time farming, most of the operators lived in the cities, where they were employed in various industries. The inducement to leave the city and settle on the land was supplied largely by considerations of increasing earnings, improved housing conditions for their families, and having something to fall back upon in case of unemployment. Although the return for labor spent by operators and their families in part-time farming was found to be, as a general rule, lower than the payments for equivalent time in industrial employment, the conditions under which part-time farmers live and work on their landholdings seem to offer a sufficient inducement for a good many wage earners to settle on the land and gain from it part of their living.

On the basis of the general adjustment of their working time, part-time farmers were found to be of two distinct types. One is represented by the operators who are regularly engaged in some employment outside of their landholdings, and who devote to their agricultural enterprises only the time left from their daily work. The other type is found in the seasonal part-time farmers who spend all their time on the land through the farming season, and hire out after this season is over. The proportion of time any operator devotes to agricultural and other occupational pursuits varies considerably in both types of part-time farming, depending in each individual case upon the size of enterprise, condition of outside employment, and amount of help supplied by the operator's family.

The figures obtained in regard to land area occupied by part-time farmers are of special significance from the standpoint of the problem of land utilization in the State. The total land area in farms in Massachusetts has been steadily declining for the last few decades, registering a loss of almost one million acres in the period from 1880 to 1925. From the character and amount of land found in part-time farming, it is fairly reasonable to conclude that much of this land has found its way into the hands of part-time farmers, who have come into possession of considerable areas formerly held by regular farmers.

In the town of Holden, part-time farmers are now holding 53.9 per cent or more than one-half of the total area in farming and part-time farming combined. It must be added, however, that much of this land is of inferior quality for agricultural purposes, and came into the possession of part-time farmers after it had been abandoned by regular farmers. In general there has been noticed a tendency for part-time farmers, especially those of foreign birth, to

[2] The 1925 Census of Agriculture found 170 "farms" in this town. If the census definition had been applied rigorously, about 300 farms would have been found.

settle on land of decidedly submarginal type. Many of them have brought much of this stony, rocky, and brush land into a condition suitable for the successful raising of crops.

Although the main object of production in most of the part-time farming enterprises lies in obtaining a sufficient supply of agricultural products for the immediate needs of the operators' families, a number of part-time farmers produce in addition a surplus for sale. In the eastern areas of the state covered by the present investigation, about two-thirds of the operators had some products to offer for sale, and in the town of Holden over one-third of the total value of the agricultural products sold by local producers came from part-time farming enterprises.

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EXPERIMENT STATION WORKERS AND THE TARIFF QUESTION[1]

Shortly after the appointment of this committee, the chairman sat at dinner opposite a gentleman who was to speak on the subject of Farm Relief through legislation. The speaker recommended, as a method of establishing the amount of tariff protection needed, the calling of a conference of farmers. Such a conference was to be "made up of business farmers," and emphatically was not to include any "professional economists or college professors because they are always free traders."

That expressed rather vigorously a prevalent view. The very men who should most fully understand tariff principles are to keep hands off the subject. Interestingly enough, that is also the point of view a considerable number of research workers in the field of agricultural economics in our experiment stations. The tariff touches men's pocketbooks, hence is supposed to be dangerous to men whose work is largely dependent upon state appropriations. Your committee holds, however, that it is highly important that the light of research be thrown on the subject. Those who are urging tariff protection on farm products are more and more calling upon our experiment stations for certain kinds of data. It is unfair to these constituents and their political representatives, neither of whom ordinarily know tariff workings, not to give them as complete a picture as possible, both as to immediate results and as to long-time effects. The time for such research is not, however, the heat of a tariff battle, but the subsequent period of cool reflection when men are wondering just how much the tariff is helping them, or what has become of promised tariff benefits.

Most "practical" men find difficulty in following out the maze of readjustments that are set up in this economic world the moment economic balance is disturbed by the levying of a tariff on a product at any commercial gateway. Indeed most economists find difficulty in doing the same thing, particularly when adequate data are not available for any adequate analysis of even parts of the problem. But as economic research is developing in our experiment stations data are becoming available which should make possible the analysis of specific

[1] This note is excerpted from a report prepared by a special committee of the Western Farm Economics Society.

aspects of the tariff problem which may be highly enlightening, both to protectionists and to free-traders. It is the aim of this report to suggest some approaches to this problem. Obviously no approach to the tariff problem can be simple, even when applied to a specific commodity. Thus, in addition to the whole series of economic changes which are brought on by the levying of an effective tariff, there are other changes, whose results must be "unscrambled" from those of the tariff. For example, tariff or no tariff, there are changes from time to time in the general price level, both here and abroad; there is progress in the arts of production which leads to changes in the relative price level for specific goods; there are seasonal changes in movements or in prices; there is growth of population, change in habits of consumers, new products are being developed, etc. The best that we may hope for the immediate future is that new light may be thrown on the problem here and there, and that we obtain a clearer vision as to the usefulness or uselessness for the purpose in hand of data which are being or may be collected in the next two decades.

In most cases it may not be desirable to establish projects dealing only with the tariff problem. There are a great many points, however, at which many of our industry studies, price analyses, and farm organization studies could incidentally throw light if our research workers are alert to their opportunities and are familiar with the tariff in theory and in practice.

There are a number of reasons why our experiment station workers should pay attention to the tariff problems in connection with their various studies if a broad agricultural policy is to be developed.

First, since tariff tinkering is certain to affect the agriculture of any state or region, tariff making should be based on as complete a set of facts as can be made available, and these should be considered in correct perspective.

Second, station men are in a position to get important data, often without greatly expanding projects, in fact, often necessarily as parts of other projects.

Third, experiment station men themselves should know the tariff problem thoroughly, particularly as it applies to the crops and products of their state.

It is often pointed out that the making of such studies involves dangers to a publicly supported institution. For example:

(1) Data are in many cases inadequate, and often ambiguous.

(2) Research methods may be used which may be unintelligible to those who are to use the results and therefore subject to abuse and misinterpretation.

(3) The reasons for making such studies may be misinterpreted. A recommendation against tariff increases, for example, may be taken as an unfavorable attitude toward the agriculture of the region.

(4) Negative results will generally be received critically.

It should be pointed out, however, that the above dangers are frequently present in many lines of research that lead to action, particularly in such fields as land utilization, price analysis, transportation, farm management, and taxation.

The methods used in the past to obtain or change tariff schedules have involved such political devices as (1) pressure on congressional committees from interested groups, (2) trading between interested groups, (3) Tariff Commission studies and hearings, (4) presidential edicts, (5) treaty arrangements.

The data more commonly considered in recent years are: cost data collected

by private or public agencies; general data designed to picture the economic position of given groups of producers; increases, actual or threatened, of imports; and the standards of living among foreign producers.

Many of the data presented may well be questioned not only as to degree to which they are typical, but also because they are largely or wholly erroneous and often, as a lawyer would say, "irrevalent, incompetent, and immaterial." The Tariff Commission was supposed to remedy matters but has only partially succeeded. Even the use of carefully collected cost data is now being questioned by the keenest students of the tariff problem, and would probably already have dropped out of use completely but for the fact that our legislators themselves either do not grasp the tariff problem or feel that cost data are as good as any as props for tariff demands.

H. E. Erdman, Chairman
E. W. Gaumnitz
Wm. A. Schoenfeld

Western Farm Economics Society, June, 1929.

ECONOMIC CONFERENCES IN NORTH DAKOTA

During the past three years, thirty-three economic conferences have been held in North Dakota for the purpose of formulating a program of extension work for various regions or counties. This method of education has apparently surpassed all previous attempts at reaching comparatively large numbers of the agricultural population. Not only those farmers and farm women who attend the conferences exhibit keen interest, but those who read the published results appear to get much more from the publication than is the case with the usual bulletin because the conclusions or recommendations of the conferences are made over the signatures of the leading farmers and farm women of the respective areas.

The conferences are of two days duration, with 200 (more or less) invited delegates in attendance. The first half day is devoted to the general statement of the aims and purposes of the conference and a general presentation of farm outlook material. This tends to direct the line of thought into proper channels for the committee work which follows.

The afternoon of the first day and the forenoon of the second day are devoted to committee work with a farmer or farm woman as chairman of the respective commodity committees and the extension specialist in that commodity acting as secretary. The subject matter presented for consideration at these conferences consists, first, of the economic situation with respect to the respective commodities, particularly of facts leading to answers to two principal questions, namely, what shall be produced, and how much shall be produced, in the given county or area; second, of the outstanding technical information concerning the respective commodities. The economic information is presented graphically if possible. These facts coupled with the knowledge and experience of the farmers of the area form the basis for the recommendations or conclusions of the respective committees.

On the afternoon of the second day the group meets as a committee of the whole for the presentation, amendment, and adoption of the commodity com-

mittee reports. Frequently differences of opinion develop at these general sessions, but invariably a basis of agreement is reached concerning the various recommendations.

The outstanding characteristic of these conferences is that the commodity specialists of the Extension Division do not offer advice or conclusions. The function of the specialist at these conferences is to present and explain the available facts and information relating to the various lines of subject matter. The proper presentation and discussion of the available facts invariably prevents wrong conclusions that might be drawn by enthusiasts for a particular hobby or commodity.

The reports of the conferences are published in sufficient number so that every home in the area included may receive a copy.

In addition to the commodity committees and the farm organization committee, home economics is represented with three committees, namely, home management, foods and nutrition, and clothing. Frequently women are members of commodity committees other than home economics, notably poultry and horticulture (including fruits and garden). Fully as much interest is exhibited in the conclusions and recommendations of the home economics committees as in those of the commodity committees.

That farmers and farm women are vitally interested in this whole matter is clearly indicated by the fact that almost invariably those that attend the first day's session either remain over night for the second day or return with some of their neighbors for the last day's sessions. Only sudden storms or impassable roads have prevented maximum attendance of delegates at these conferences.

At the conclusion of the conference, a permanent agricultural extension committee is selected consisting usually of the chairmen of the respective commodity committees. This county extension committee later becomes the advisor and guiding hand in assisting the county agent in carrying out the recommendations of the general conference.

Following the general conferences, commodity conferences are held in the respective counties, to which 25 to 50 interested people of the county are invited and a half day to a day is utilized by this group with the county agent and members of the county extension committee for the purpose of formulating specific methods or projects for carrying out the recommendations of the commodity committees of the general conference. The methods devised may consist of any one or several of the usual extension projects consisting of demonstrations, community meetings, or other lines of activity. Members of the commodity conference become leaders of the particular projects for the respective communities of the county.

Usually a series of commodity conferences follows the general economic conference, and after these commodity conferences have been held the county extension committee with the county agent attempts to coordinate the work along the lines of subject matter and methods so far devised so as to create a balanced program of extension work for the county. The presence of the state specialist for each commodity is desirable at the commodity conferences, but is not essential if the county agent has his suggestions as to methods and projects well in hand.

An essential factor leading to the success of the economic conferences is the preparation of subject matter material in form to be readily and quickly understood by the members of the various committees. The subject matter relating to each commodity is assembled previously by the farm economics group in cooperation with the various departments of the college and the Department of Agriculture, and this material is invariably made up in graphic form in quantities sufficient so that each committee member may have a copy of the material concerning the commodity in which he is principally interested. Sufficient extra copies of these commodity folders are available for any who may wish the material for other commodities.

To date, county economic conferences have been held in all counties having county extension agents except five, and these will be covered at an early date. Regional conferences have been held so that representatives of every county of the state have participated in one or another of these sessions.

Some counties have practically completed the series of commodity conferences developing methods of work for putting the program into effect. Other counties are just beginning this phase of the program.

Factors that have contributed to the success of the above outlined program have been the whole-hearted cooperation of various divisions of the United States Department of Agriculture, the various subject matter departments of the Agricultural College, the whole-hearted support of every member of the extension organization, and the thoughtful and careful cooperation of thinking farmers and farm women.

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THE REPORT OF THE COMMISSION TO STUDY THE CONDITION OF FARMERS IN VIRGINIA

The 1928 session of the General Assembly of Virginia, apparently feeling that the farmers of the State were in an unprosperous condition and in need of some sort of relief, provided for the appointment of a commission "to study the condition of the farmers of Virginia" and report to the next session of the assembly in 1930. The commission consisted of eleven members, two of whom were appointed by the President of the Senate from members of the Senate, three by the Speaker of the House of Delegates from members of the House, and six by the Governor. The members served without compensation, but had their actual expenses paid.

The law creating the commission instructed it to "make a careful study of the general condition of all the agricultural interests of the State; the efforts and expenditures made for general agricultural advancement; for the standardization and sale of all kinds of farm crops and products; for the improvement and marketing of livestock; and all other matters affecting the general economic condition of the farmer."

The members of the commission, as stated in its report, were all "directly concerned with farming in Virginia, and with one exception all of them are now actively engaged in practical agricultural operations in this State." The one member of the commission who was not actively engaged in agricultural

operations was Dr. Julian A. Burruss, President of the Virginia Agricultural and Mechanical College and Polytechnic Institute. Dr. Burruss was elected chairman of the commission.

The commission was divided into ten committees, each of which worked on a particular phase of the whole problem. The findings of the commission are arranged under the same plan, except for the addition of an eleventh section. The first part of the report consists of the recommendations of the commission stated in brief form. The facts and reasoning on which the recommendations are based are contained in the second part of the report. The commission secured assistance from various members of the faculties of the Virginia Polytechnic Institute and the University of Virginia, from various state departments and from other interested persons. The general procedure was for the commission to hold meetings at which these persons were invited to present their views on some phase of the agricultural situation and particularly their ideas as to what should be done to improve conditions. The commissioners apparently took the recommendations thus secured, selected the ones of which they approved, added any others they wished, and so secured the recommendations given in their report.

The resulting recommendations are on the whole sound, but some of them are so general in character that it is difficult to see how they can be of much practical use to the General Assembly or to any other interested body. For instance, it is recommended "that efforts be made to increase generally the income of the farmers of the State to the end that their standards of living may be raised" and "that the reduction of local taxes be sought through the improvement of the efficiency of our local units of government."

The section of the report on "Standards of Living" is confined mostly to a discussion of the present low standards of living among Virginia farmers and the need for extending the services of the Agricultural Experiment Station, Extension Division and other agencies in order that the situation may be improved. In order that this may be accomplished, it is recommended that the funds at the disposal of these agencies be increased by the necessary amounts. This section also contains a recommendation to the effect that the State support of public schools be increased and distributed under a better plan than is now used.

Recommendations on the subject of marketing are found in two different sections of the report. It is urged that the State amend its cooperative marketing act to include cooperative purchasing and to provide that up to fifty per cent of the business may be transacted with non-members on a strictly non-profit basis. Another section contains recommendations on how to improve the grading and inspection service of the State. The most interesting suggestion here is "that provision be made for a suitable trademark for quality of Virginia products, the use of which shall be restricted to commodities which are equal to or better than a designated standard as shown by official inspection; it being understood that the special trademark is to be supplemental, and not to displace the use of trademarks and brands now in use, or which may be adopted in the future, and that the use of the said trademark shall be voluntary."

It is suggested that the State and Federal government help to prevent surplus production by facilitating the migration of sub-marginal farmers into industrial towns, extending agricultural outlook information, promoting forestry, giving agricultural instruction for increased efficiency of production, withholding funds for the development of new lands, encouraging orderly marketing, establishing public parks, and having the title of lands delinquent for taxes revert to the county. The government should help in several ways to dispose of such surpluses as may occur in spite of this aid. This may be done by providing better grading and branding laws, encouraging the conversion of more surplus products into by-products, assisting in advertising Virginia products, and by promoting the industrial development of the State.

A variety of recommendations are included under the head of transportation, most of them calling upon the Commerce Counsel of the State Corporation Commission to take steps to remedy particular grievances against freight rates on certain commodities.

The recommendations on the subject of taxation are brief and fail to mention some of the more important ills of the tax system so far as the farmer is concerned. It is recommended that local taxes be reduced by improving the efficiency of the local units of government and that the State increase its support of schools, farm and home demonstration work, highways and health work. No mention, however, is made of the need for improving the local assessments of Virginia, which at the present time are very poor,[1] nor is adequate recommendation made, either in the form of increased income taxes or otherwise, as to where the State can get the funds for the increased program of activities outlined elsewhere in the report.

Under the head of rural electrification, the commission recommended the adoption, with slight changes, of the report of a special committee on the subject which worked out a rather detailed plan for financing the extension of electric lines into rural territory.

The recommendations on the subject of land utilization and forestry relate mainly to the need for completing the soil survey of the State as soon as possible and the need for a definite forest policy and improved forest management. The subject of forest taxation is mentioned, but no definite recommendations, other than for favorable taxation, are made.

The report was submitted to the General Assembly at the beginning of its session early in January of this year. At the present writing the assembly is still in the last weeks of its session, so that it is impossible to know what its final action will be on most of the recommendations which called for legislative action. It appears probable, however, that a good many of the recommendations for increased appropriations for the State Agricultural College and other State Departments connected with agriculture will be favorably acted upon by the assembly, although the budget bill has not as yet been finally passed. The recommendations regarding cooperative marketing have been passed by the House of Delegates. Bills carrying out certain of the recom-

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[1] This fact is demonstrated in Bulletin 268 of the Virginia Agricultural Experiment Station, "Taxes on Farm and Urban Real Estate in Virginia," and in Finance Document No. 5 of the Virginia State Chamber of Commerce, "Reconstruction of Virginia's Tax System."

mendations in relation to forestry and rural libraries have been introduced and some of them will quite probably be passed.

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THE DEFINITION OF EFFICIENCY

Surely no one will want to quarrel with Dr. Allin's statement in his note in the January issue that the mistake of American farmers in the recent past has not been in increasing the efficiency of American agriculture too much, but in failing to reduce input as needed at the same time. As a practical matter, however, one might affirm that since in real life producers rarely do decrease their input as needed at such times, it behooves one to see that efficiency is not increased untimely or too rapidly. Otherwise there will be a decrease in what the author of this note calls "economic efficiency," or value of output per unit of input, as distinguished from pure "physical efficiency," expressed in terms of bushels or tons of output per unit of input.[1]

It is this physical efficiency which Dr. Allin, following Dr. Common's lead, sets up as the whole concept of efficiency. The concept of physical efficiency is a useful one in qualitative analysis, but difficult to reduce to a measurable basis. Dr. Allin states that a comparison of the efficiencies of two farmers can be made by giving them the same quality and quantity of land and equipment to use. But it is obvious that the two farmers might compare very differently on one type or size of farm from what they would on another. Each farmer has a particular type and amount or size of farm and equipment which is best suited to him, and these are likely to be different from the particular type, amount and size that is best suited to another farmer.

More important, the output obtained when a man works with land and equipment represents the contribution of the land and equipment as well as of the man. Would one say that the efficiency of the man was greater if he worked in a larger or better piece of land and hence obtained more output? Dr. Allin goes so far as to say that output is "*produced* only by man-hours. Nature *produces* nothing." This clearly affirms that I, as a farmer, not only become more efficient as I get a better piece of land to work, or better equipment and cattle to work with, but that absolutely all the increase in product represents additional efficiency of mine.

There is, of course, a loose general sense in which the term efficiency is used, having reference to total output of society, or of some industry, per man at work, or man-hour of labor if one wishes. This is the sense in which the term is used in Dr. Allin's fourth paragraph. But this use of the term can never be carried over to the measurement of individual differences in efficiency, as in his paragraph following; nor allowed to take on the further implication that this labor *produces* all the product.

Dr. Allin's use of the phrase "use-value" is very confusing. To most of us, the value we get out of the use of a thing depends upon the amount of it that we have used or have available for use, and hence upon its scarcity. But

[1] Production Organization, pp. 148-9.

Dr. Allin sets up a definition of use-value which is in terms of physical product only. He would seem to say that a ton of Scotch thistles per man represented just as much efficiency as a ton of cotton per man—that scarcity and utility have nothing to do with productivity.

The author of this note uses the term "economic efficiency" in his *Production Economics* to take account of the relative values of the different products that may be produced, and of the values of the different cost-goods that may be used in producing them. It is assumed in this concept that to be efficient a farmer must choose his elements of production and his product so as to have the largest net value of product left for his own labor and management. It seems desirable to distinguish in this way between physical and economic efficiency; but both concepts are valuable.

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SOME EVIDENCES OF CHANGING AGRARIAN SENTIMENT IN THE CANADIAN WEST

Since the early agricultural endeavors of the Selkirk colonists in western Canada, the farming population has, until recently at least, been inclining increasingly to wheat as its main economic reliance. From this specialization have resulted increasing wheat surpluses and increasing dependence upon the world market. Thus it is not difficult to explain the farmers' allegiance to political doctrines of a free trade nature, and their support of the Progressive and Liberal parties, whose policies show the greatest tendency toward this ideal. Because of the effective union in Canadian politics between industrialized Quebec and the Prairie Provinces, the predominantly lower tariff party has been forced to compromise in tariff revision. This compromise has mostly taken the form of concessions to the West in improved facilities for grain marketing, it being assumed that reductions in marketing costs would offset the increased production expenses from the continued application of the protective tariff on foodstuffs and implements of production. The economic program of the country—the building of railways and canals, the location of towns and distribution points, and the erection of elevators—has been consciously adapted to promote efficiency in wheat marketing and to reduce costs in wheat production. The Grain Act is watched as closely in the Canadian West as the tariff is in the American West, but for a vitally different reason. It has been moulded to aid the Canadian grain farmer in the world markets, while the tariff of the United States is ostensibly to preserve the home market for the American producer.

A movement which has been in particular evidence in the post-war period is the broadening of western agricultural practice from wheat-cropping to a combination of wheat and animal products. Coincident with this movement, and evidently related to it, there are unmistakable signs of a changing agrarian view of Canadian fiscal policies.

During the Great War and for some years afterward, western wheat-growers enjoyed a generally prosperous period. Then the Fordney-McCumber tariff

began the exclusion of wheat from the United States market—a device which is almost completely effective today. More recently, European countries, which formerly were anxious to admit such vital foodstuffs free or with a low tariff for revenue, have begun the elevation of tariff scales until some have become prohibitive. A number of internal circumstances, varying from rust depredations in Manitoba to extended irrigation in southern Alberta, have accelerated an incipient change to diversified farming, especially along the fringe of park belt on the north and west of the central wheat area. The main deterrent to the expansion of this movement is the difficulty of obtaining markets; Canadian producers of animal products have been continually hampered by the height and uncertainty of American and foreign tariffs. But the wheat producer has been beset with the same difficulties, and in recent years the effects of rising tariff barriers have been accentuated by increasing regional surpluses and generally lowering prices. Consequently there are many farmers with grave doubts as to the wisdom of continued specialization.

The natural outcome of these conditions is a study of the home market. Although Canada still has less than ten million people, there are certain important animal products readily produced in Western Canada in which the Canadian production is insufficient to meet the home demand. In a number of cases, the deficiency in home production is being made up by imports from countries whose tariffs on Canadian farm products are virtually prohibitive. In consequence, in the past few years the West, which formerly inclined to wheat-growing and freedom of trade, is now beginning to produce diverse products and to demand the preservation of the home market for these products.

Three applications of western farm organizations for upward revisions of the tariff are at present being considered by the Advisory Board on Tariff and Taxation at Ottawa. Increased tariff rates are asked on eggs (R. 125), butter and cheese (R. 150), and on meats, particularly mutton (R. 166). The possibility of higher American tariffs and the entrance of meats and butter under the Australian Trade Agreement have combined with the changing western farm program to prompt the expression of new "Farmer" fiscal policies. The recent debates of the House of Commons illustrate this view. One of the prominent western members, Mr. E. J. Garland, (Bow River), has soundly berated the Australian Agreement for depriving the western farmer of part of the home market and at the same time assisting "certain industries which in virtue of their highly privileged position under the customs tariff have been built up at the expense of other classes of Canadians." Such a situation offers the prospect of analogies with conditions in the United States, where the struggle between the "agricultural west" and the "industrial east" has long been prominent among fiscal questions. There are many points of similarity and of difference, and it will be interesting to compare the rate and degree of change in farm diversification—and likewise the related demands for the preservation of the home market—in Canada with the agricultural history of the United States.

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THE RELATION OF WEATHER TO THE QUALITY AND PRICE OF MASSACHUSETTS ONIONS

Statistical studies of the factors affecting prices of farm products are frequently hampered by the lack of a quantitative measure for variations in the quality of a crop from one year to another. With certain fresh vegetables, it is probable that variations in average quality from season to season cause differences in prices as great as those caused by any other factor. When studying farm prices which have not been quoted on uniform grades, these variations remain as residual errors to obscure other relationships. Even when prices for a narrow grade are studied, there are ordinarily available only data on the total supplies of all grades, whereas the proportion of this supply represented by the higher grades may be an important price factor.

Dr. Holbrook Working in his study of factors affecting the price of Minnesota potatoes[1] measured quality by departures from the normal differential between the price of Minnesota potatoes in Minneapolis and the price of Maine and New York potatoes in New York City, assuming the latter price to be based on more nearly uniform quality.

A few studies during recent years have attempted to measure the effect of quality factors on prices. Among these are the studies of the influence of protein content in wheat to prices, and of egg quality and prices. Dr. F. V. Waugh has developed a method for measuring differences in prices at a given time due to differences in the quality or appearance of individual lots sold, working with asparagus, cucumbers, and tomatoes in the Boston market.[2] Such studies have shown the importance of quality in determining the price for a given lot of produce, but they do not measure its influence in establishing the whole level of prices at different times.

While attempting to measure the influence of production upon Boston wholesale prices for Massachusetts onions, the authors of this note shortly discovered that inability to measure quality was a limiting factor in the analysis. The average quality of Massachusetts onions is known to vary within wide limits from year to year, and the only prices available represent very different qualities during different seasons. Recent success in estimating yields of this crop from weather data suggested the possibility of estimating average quality in a similar manner.[3] Observation and interviews with various dealers revealed that while color, size and similar characteristics are considered by the trade, the most important index to the keeping quality of onions going into storage is firmness or hardness. Firm, dry, mature onions store well, whereas softer onions often rot or start to grow in storage. Also a larger part of the crops produced in dry seasons is suitable for storage, and the shrinkage in storage is less than for crops produced during wet years. This indicates that moisture and the amount of good drying weather at harvest time may have an important relation to quality. In order to test this hypothesis, an attempt was made to

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[1] Working, Holbrook. "Factors Affecting the Price of Minnesota Potatoes." Minnesota Tech. Bulletin 29, October, 1925.

[2] Waugh, Frederick V. "Quality Factors Influencing Vegetable Prices." JOURNAL OF FARM ECONOMICS, Vol. 10, No. 2, April, 1928.

[3] Stevens, Burmeister and Waugh. "Methods of Forecasting Onion Yields. The Relationship of Onion Yields to Weather Data." May, 1929. Unpublished. New England Crop Reporting Service, Boston, Mass.

measure the relation between observed variation in prices, and rainfall, temperature and proportion of bright sunshine for the different years.

The data used were: (1) annual average wholesale prices of Massachusetts seed onions in Boston, September 1 to December 31, of each year, from 1918 to 1929 inclusive, (2) United States Department of Agriculture estimates of onion production, and (3) weather data from the Amherst weather station, located near the area in which these onions are produced.

Conventional statistical methods were used to isolate the influence of production on price, and the residuals from this analysis were then related to the various weather factors. Data were available for only 12 years, since estimates of production prior to 1918 are usually not considered to be reliable for this crop. In order to use prices for the years 1918 to 1921, it was also necessary to deflate the entire series, the Bureau of Labor Statistics index of wholesale prices being used for this purpose. Total production in the late and intermediate crop states apparently has the greatest influence on prices for Massachusetts onions in Boston, the inclusion of early production and production in Massachusetts giving no measurable improvement in results. Since there has been an upward trend in production throughout the period, deviations from a trend fitted to the production data by the method of least squares were used in the analysis. The relation between the deflated prices and these deviations from trend could then be described by a free-hand curve, although the scatter was relatively great. It was the deviations from this curve that were compared with the weather data.

Of the weather factors used, including rainfall, temperature and percentage of bright sunshine, for various months and in several combinations, rainfall during the month of August appeared to be most closely related to prices after the influence of production was eliminated. When charted in the form of a scatter diagram, the correlation between this factor and the residuals from the first analysis was very apparent. On the average, every inch of rainfall during August has been associated with a decline in average price for the season of slightly over 30 cents a hundred pounds. The relationship appeared to be linear within the widest range of rainfall recorded for that month during the period studied (1.54 inches to 8.40 inches).

At first it appeared that hours of bright sunshine during August, expressed as a percentage of the total hours possible, was also closely related to prices. However, upon closer examination it became apparent that this was due to the close correlation between rainfall and sunshine; dry, cloudy weather like that of 1929 seems to result in as good quality as does clear weather with the same rainfall. Temperature is much less closely related to quality and prices; and likewise rainfall and sunshine during other months of the growing season.

July temperature and cumulative rainfall from May 1 to August 31 are important weather factors affecting onion yields in Massachusetts. Rainfall during August alone, however, is very slightly related to yield. In any case the influence on price could hardly operate through yield and supply, since Massachusetts production is practically unrelated to price during the period studied.

These observations agree with our hypothesis that a large part of the variations in prices not related to production is caused by differences in quality, and

that these variations may be estimated from weather data. Although the explanation of prices is by no means perfect, it is greatly improved by using rainfall. The practical value of this factor for forecasting is greatly enhanced by the fact that the rainfall data for estimating quality are available before the crop is harvested. It also appears from the data that the movement of prices through the storage season may be related to the average quality measured in this way, and that the use of weather data may aid in forecasting the seasonal movement in price.

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Harold B. Rowe

Massachusetts Agricultural College

THE INVENTION OF A NEW WOOD FEED PRODUCT IN GERMANY

In one of the leading German economic magazines, *Der Deutsche Volkswirt*, the famous chemist, Friedrich Bergius, who is well known because of the process which he has invented for converting coal into fuel oil, recently discussed the possibility of starting in Germany the production of a new wood feed product on an industrial basis.[1] According to the author the development of such a feed would not only contribute to the solution of the German surplus feed problem in the Eastern regions but also might involve the almost complete elimination of the imports of grain feeds from foreign countries for the raising of hogs. Such a change would, therefore, also materially affect the American exports of corn and barley to Germany.

The chemical process for the manufacturing of the new feed product is based on the patented formula of Professor Willstaetter. By wood hydrolysis fire and waste wood is transformed into a carbohydrate which is soluble in water and can be used for feeding. This process has been further developed by industrial research over a period of thirteen years and technically and economically improved to such a degree that the production of the wood feed can now be taken up on a satisfactory basis. It has already been tested in a small plant, and, as the author says, "the feeding experiments have proved that the carbohydrate resulting from wood hydrolysis . . . . has the same feeding qualities as the other carbohydrates."

The process involves the treatment of small pieces of wood with acid and results in the yield of digestible pure carbohydrates to the amount of about 65 per cent of the weight of the wood. A complete utilization of the wood takes place. Apart from the 65 per cent carbohydrates, 4 per cent acetic acid and about 30 per cent pure lignin (which can be used for producing briquettes or charcoal) are left. There is almost no restriction as to the shape and quality of the wood which can be used. An abundance of suitable wood, therefore, is available in Germany.

Bergius thinks that with the aid of this new feed product enormous progress can be made in the solution of the hog feed problem. Up to the present time, the chief troubles in this field have been the enormous fluctuations of the potato crop and its perishability, the decrease in the consumption of rye and the consequent necessity of feeding it in years of large crops, the hog

[1] Bergius, Friedrick, Das deutsche Futtermittel-Problem, Der deutsche Volkswirt, December, 1929, pp. 385-390.

cycle and the long distance between the region of heavy hog production and the region where large surpluses of rye and potatoes are produced. The elimination of these troubles is at the same time closely connected with the solution of the most important question of the German feed policy, which concerns the finding of an outlet for the feed surpluses of the Eastern regions. A factor which makes the solution of this problem more difficult is the annual import of 3,000,000 to 4,000,000 tons of barley and corn. Both these products contain little protein but a high percentage of carbohydrates. They are, therefore, comparable with potatoes and rye in their nourishing value.

Before the Eastern potato can replace the imported grains, the following conditions with regard to its dried product, potato flakes must be met:

(a) removal of wide price fluctuations

(b) extension of production and dependable supply of a minimum quantity also in years of small crops

(c) cheaper prices for the dried product and a fair price for the potato raiser.

Condition "b" is easily fulfilled if "c" has been achieved, i.e. the production of the dried product at a price which assures its outlet. Conditions "a" and "c" can be fulfilled if there is the possibility of mixing the dried product with an equally nourishing product that is available at a stabilized price, which is at the same time so cheap that the average price of the resultant feed product is below the import price of the foreign grain feed. A product which meets these conditions has been found in the above carbohydrate manufactured out of wood. With regard to the cost of production Bergius says: "Careful investigations have furnished a reliable basis for the price of wood to be used in the calculation. Based upon this, the technical calculation shows that after care has been taken of necessary reserves and capital profit the carbohydrate can be produced at a price which will meet the above mentioned requirements for a product complementary to the potato flakes." He further states that "probably the natural feed products cannot entirely be replaced by wood carbohydrate. But there is a possibility of replacing up to 50 per cent of the carbohydrate in the feed products by the wood carbohydrate." It is therefore likely that about 1,000,000 to 1,500,000 tons of wood carbohydrate can be absorbed annually by the German market.

In German agricultural circles the fear arose that the new feed product might become a danger to the Eastern potato production. However, the extraordinarily cheap price of the carbohydrate shows a way out of the conflict between economic and agrarian interests. Out of the agricultural ranks the suggestion has been made to use the wood carbohydrate feed for lowering the price of the dried potato. No doubt such a combination can only be carried through with satisfaction if the respective industrial branches come to a far-reaching understanding. The achievement of an agreement would not be an easy undertaking, but in the opinion of the author the difficulties "should not be insurmountable." According to the calculations which have been made the mixed feed product would be available at Rm. 166—in a year with a large potato crop (when 120,000 t. of dried potatoes could be produced) and at Rm. 170 in a year with small yields (when only 40,000 t. of dried potatoes could be supplied) and after transportation has been paid be sold in the Western market at an average price of Rm. 178. This calculation also assumes that in the year

of the large potato production the dried product would be mixed in the ratio of 50:50, whereas the ratio would be 36:60 in the year of the small crop. It further assumes that in the year of good yields one-sixth of the potato crop is put into storage.

At the average price of Rm. 178 the new feed product can well compete with the imported grains. The average price of the last five years for the imported corn was Rm. 196 per ton, f.o.b. Hamburg. Considering the cost of further transportation and processing the price will rise to about Rm. 204 per ton. The price of barley is a little lower. But, on the other hand, barley has less nutritive value than the mixed feed product.

In the opinion of the author, this new feed product would bring about the following fundamental changes:

(1) The dried potato—cheapened by the wood carbohydrate—can reach the Western market and be offered there below the average corn price.

(2) Because it is possible to store the mixed feed, it can also be used as a collateral and must not necessarily be dumped upon the market when low feed prices prevail.

(3) The fluctuations of the potato crop can be taken into account by using 200 per cent more potatoes in good years than in bad years, while the fluctuations of the quantities of feed products transported to the West will amount to only 25 per cent.

(4) The price of the mixed feed can be kept on approximately the same level in good and bad years.

It is believed that 3,000,000 tons of the new mixed feed can easily be produced annually in the different regions of Germany. This would have a very favorable effect on the potato situation. "Within the maximum fluctuations of the potato crop, around about 10,000,000 tons, approximately one-half of this amount could be absorbed and used in view of an almost complete elimination of grain feed imports," says Bergius.

The mixing of the wood feed with the potato flakes can take place in the East as well as in the West. Because of this new improved outlet for the potato it is possible that a stimulus for the extension of the production of this crop will be effected. The invention further involves the creation of a new industry in the East where almost no industries exist so far. It would also have a stimulating effect on German forestry.

A very beneficial influence can also be expected on hog-production conditions. The new mixed feed manufactured in the way outlined by the author will probably tend to stabilize the relation between hog prices and feed prices. It may contribute to the destruction of the disadvantageous hog cycle and thereby also benefit the trade in feed products.

In order to solve the German feed problem it will be necessary to regulate the feed imports in such a way that foreign feed grain will only supplement the German feed supplies inclusive of the Eastern production of carbohydrates. The author recommends a slight increase in the duty on foreign feed and the use of this duty as an infant industry protection in order to introduce the East German potato flakes in Western Germany and to give time to the world market to adjust itself to the new German feed situation.

Erich Kraemer

FOREST SURVEY

The Forest Service of the United States Department of Agriculture announces the appointment of C. M. Granger as Head Forest Economist, to take charge of the nation-wide Forest Survey which is now being organized. Mr. Granger has had an unusually meritorious career of more than 20 years in the Forest Service, during which time he has advanced through the various grades to District Forester in charge of the Pacific Northwest District, which includes the important timber States of Washington and Oregon.

The Forest Survey was authorized by Section 9 of the McSweeney-McNary Forest Research Act of 1928. The project contemplates a thorough-going appraisal of existing forest resources; of present and potential growth of timber; of the current drain through cutting, not only for lumber but for the many other forest products, and also through losses from fire, disease and insects; and of the present and prospective requirements for forest products. The results of this Survey should provide an adequate foundation which has hitherto been lacking for the development of economically sound industrial and public forest policies.

It is expected that approximately 10 years may be required to complete the Survey. It is planned to undertake those phases, such as the resource inventory and the growth studies, on a regional basis. Some phases of the study are more distinctly nation-wide and inter-regional in character and will have to be handled accordingly.

Most of the initial appropriation of $40,000 for the current year is being used to start intensive work in the Pacific Northwest where progress is going forward in the organization of personnel and the preparation of plans. It is planned to increase the allotment to this region for the coming year by $50,000. It is also planned to allocate $25,000 to the inauguration of regional work in the southern hardwood region, and $10,000 for one or two advance individual assignments in other important regions. The order in which the other forest regions will be taken up has not yet been decided. It will depend upon such considerations as the relative need for the work, the amount of cooperation that can be attained, and the existence of public and industrial interest.

Obviously it will not be possible with the total sum of $3,000,000 which has been authorized actually to survey intensively a very large proportion of the country's almost 500,000,000 acres of forest land. It is planned to utilize the vast quantity of more or less incomplete information now in the possession of many different public and private agencies, including forest industries and private owners of forest land. All of this material will have to be checked, supplemented, and converted into common terms in order to make it usable. This will, of course, require a large amount of field work. A high degree of cooperative interest and assistance on the part of Federal, State and private agencies, both in the development of plans and in the prosecution of the work, will be essential for the successful completion of the Survey, and is confidently anticipated.

R. Y. Stuart

U. S. Forest Service

BOOK REVIEWS

The Farm Export Debenture Plan, by Joseph S. Davis. Pp. x, 274. Stanford University: Food Research Institute, 1929. $3.00.

The present volume will be welcome to a great many readers. It bears the ear-marks of careful consideration, although it cannot be said to be based mainly on indisputable facts. Neither will any discussion of a radical measure be based mainly on facts. By the very nature of the case, a radical proposal must be based on unproved, perhaps unprovable, suppositions, even on hope. However, in order to win recognition and adoption, a proposal must support itself by such analogies, parallels and logic as are available. It appears that Dr. Davis set himself the task of criticizing, weighing and holding up to inspection the many arguments brought forward in support of the debenture plan. He has done an admirable piece of work, yet one cannot escape the feeling that he came to the task with the conviction that no matter how good the affirmative arguments should prove to be, that the negative was destined to win. Probably this state of mind characterizes the great majority of investigators who attempt the solution of controversial problems.

The debenture plan is well characterized in the chapter, "Essential Features," yet it hardly seems necessary to hold its supporters to the line quite so rigidly as to say, "The theory is that exporters . . . . would force up the domestic prices of these commodities by almost the full amount of the debenture rates." True enough, many advocates of the plan are as extreme as that, yet numerous others favor the plan without being quite so exacting in their claims. Furthermore, the arguments of Dr. Davis to the effect that the debenture rates will fail signally to reflect themselves in higher prices, are not necessarily convincing. That the case is complex, and beyond definite prediction, any fair student will hardly deny.

The statement is made that the adoption of the debenture plan would strengthen the grip of the protective tariff on the country. On this point there may well be difference of opinion. No doubt the worst, largely hidden features of the tariff is the enforced payment of higher prices for certain goods by a class of people who in turn are unable to shift the charge to a third party, as the consumers. The farmers constitute such a class. They have been the tariff goats for a century. Should the debenture plan be adopted, and work measurably well, it would give the farmer a chance to sit in at the tariff gaming table with something more than a ragged two-dollar bill. He could then ask that concessions, as well as promises, be made to him. In other words, the farmer could say to the tariff crowd who might not like the debenture influences: "Neither do we like the tariff." The statement that "the degree of injustice [to the farmer, through tariff and other public policies] or inequality has been much less in reality than it has been commonly made to appear", is an unsupported declaration, which cannot be accepted without evidence.

Dr. Davis disclaims holding a brief for the tariff, and no one will accuse him of it, yet he makes several statements which all tariff lobbyists will gloat over.

As an example, the author says, "The *normal* expectation is that as a domestic industry, thus protected, establishes itself firmly, it will be able to produce output at lower cost, so that sooner or later it will be able to supply the domestic market at moderate prices, and eventually be able even to export its products in competition with foreign producers." Verily, this sounds like the arguments of a century and a half ago, and note that it does not say "and dump some portion of its product over a high tariff wall into the world markets." Very properly Dr. Davis quotes Hamilton, and not a modern protectionist, in support of this contention.

There will be very general agreement, at least among economists, that the tariff rates are a poor, inadequate and uncertain basis for the setting of debenture rates. Many farm produce tariff rates were set by people who knew they would not work, and so felt that it did not matter what the rate was—for example, the cereal schedules. On the other hand, it will not be so easy to argue that the failure of a debenture rate to spread itself evenly over the country is so objectionable. Few tariffs are equally and uniformly effective. If the debenture rates should help half of the tobacco growers, and two-thirds of the wheat growers, so be it. There would be some shifting among farmers so as to bring about a more equitable distribution of advantages than appeared at first. Remember that the McNary-Haugen Bill was predicated for years on the proposition that to help perhaps half the farmers was to help them all. The plan would be somewhat unequal in its results. So will any other plan.

While one must concede that the author is correct in saying that the debenture bounties are not logically viewed as an extension of the tariff, it may be asserted that it is a logical counter-irritant, or antidote, to the same. It is a plain case of an attempt to fight the devil with fire, even though the attack might not prove successful. To take some portion of tariff receipts with which to reimburse those who pay a disproportionate part of the tariff bill surely has a strong appeal, not alone to the aggrieved party, but should enlist the co-operation of the unbiased third party, if there be such.

Many of us will continue to believe that the purpose of the tariff is to raise prices above the world levels at the time of the tariff enactment, and so soon as they are endangered by importations, to raise them again, and so prevent outside competition. And this in the name of standard of living, equality in costs as compared with foreign production, or any other subterfuge. But raise prices the tariff advocates will so long as they can. Of course, we will all agree that the main desideratum is the maintenance of an industry within the country at a profitable level of prices, and that these prices may not be higher than in foreign countries; but the tariff is the visible means of keeping the lower priced goods furnished by outsiders from coming into the circle. The farmers want to play the same game, but haven't learned how to an appreciable extent.

With respect to the working of the debenture plan, should it be adopted, the author is pessimistic, extremely so, and quite possibly unduly so. Dr. Davis avers that he does not wish to give an exaggerated view of the complications involved in the reflection back to the farmer of the debenture additions to price. Nevertheless, it would seem that he has done so. It is hardly going too far to assume that advantages gained by exporters under the debenture

plan would result in competition among themselves, which would compel a bidding up to something near the full measure of the advantage. This should apply to flour as well as to wheat, but in any case, we export twice as much wheat as flour. Neither must it be forgotten that the expectation is that wheat will be raised in price the country over. Hence the miller would be obliged to pay the added price to the farmer when he purchased the wheat out of which to make flour. It should apply to the export of pork and lard, but we must not split hairs. Even though the farmer may not receive 90 per cent of the debenture figure, he may be greatly helped by getting 60 per cent. Dr. Davis very properly observes, by way of comparison, that the tariffs are only partially effective. His estimate of 15 or 16 cents, which the farmer might get out of the 21 cent bounty on wheat, is enough to bring real prosperity to many thousands of wheat farmers.

There would be a great temptation to write a paragraph on the contention by President Hoover that an increase in price, based on debenture bounty, would stimulate production were it not that Dr. Davis has quoted such an apt comment on this point from the *Congressional Record*. What price increase will not stimulate production? In this respect, price influence is universal, or nearly so, within the range of competition. The issue should be wholly on the question as to whether or not the debenture plan will work to the advantage of the farmer. Initially, it certainly would. That it will not work uniform benefits to all farmers is, if not immaterial, at least not a final objection. Dr. Davis over-works the supposed design of the plan to raise prices permanently. No human institutions are permanent. If farm prices could be raised long enough to allow farmers to pay off their present obligations, it would give them a new lease of life—and new obligations—but this is the way of the world.

In connection with the question as to influence of government in aiding groups or industries, railroad legislation is mentioned. The reader will find it hard to accept at face value the statement made in this connection that "most of the public regulation of railroads has been in the interest of shippers, including farmers, rather than . . . . in behalf of railway shareholders." It surely looks as though, and perhaps justifiably, that freight rate regulation has always been made in recognition of a necessity of permitting railroads to earn at least commercial rates, whether or not the shippers became bankrupt because of the charges.

In general, it should be said unqualifiedly that the book is the weightiest and most acceptable contribution to the debenture proposal yet made. It has a scientific, even though not wholly judicial, setting and treatment. The author wants to be fair, and no doubt is wholly so, but he doesn't believe in the scheme, and every page of the book proclaims his conviction. His skepticism is based on a mass of facts and a logical treatment of them. But these excellent traits, and achievements, fail to close the argument. It is rather the presentation of the negative side in a masterly manner. Can the affirmative meet the arguments and in addition build up a convincing case? If we want a radical remedy, the debenture plan is entitled to consideration. If we are willing to leave the healing of the farmers' ills to the slower processes of time and to gentle prophylactics and safe restoratives, the patient, collectively, will recover,

but individually there will be many fatalities. Governmental action is in no small degree responsible for the farmers' plight, but as a people, we do not seem disposed to run any risks, or incur much expense, in an effort to undo the results of past unfair treatment, or to attempt positive remedies.

B. H. Hibbard

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Too Many Farmers: The Story of What is Here and Ahead in Agriculture, by Wheeler McMillen, Rahway, N.J. Quim and Boden Co., Inc. $2.00.

Unlike many treatises dealing with the agricultural problem, this book contains no charts, graphs, pictures or statistical tables. Its purpose, as stated by the author, is to "broaden or clarify the general reader's understanding of agriculture," by telling "not what is the matter with farming but what can be done about it," by "offering a clear idea of a series of solutions to the farm problems."

The general reader not acquainted with recent agricultural literature will find that this book covers a wide range of topics bearing on the agricultural problems, as evidenced by its VIII parts divided into XLVI chapters. Persons that have been following the discussions relating to farm problems will find in this book a few specific illustrations that may be new to them.

The text, insofar as it is tied together, is built around the following statements: "farm profits are inadequate" and "farm income equals (price times quantity) minus costs." The author disposes of the whole question of relative incomes by the following sentences. "The disparity between income from farm enterprises, and from the investment of equal labor, capital and managerial ability in industrial effort is apparent to all who have examined the facts. This income disparity has been proven over and over by statisticians, economists, official commissions and other grave authorities until more figures are superfluous." It is difficult to agree with the author in these statements since available data indicate that the numerous small corporations in this country earn about the same as the average farm, and since there are no facts as to the real income of the small businesses conducted by individuals or partnerships which can be used for comparison. Moreover, there are no comprehensive figures as to real earnings of factory employees or even unemployment.

The formula "Farm income equals (price times quantity) minus costs" does not apply to farmers' income because a large portion of a farmer's real income is derived from the farm in the form of food, fuel and shelter without any prices attached. It is highly probable that such income has been greatly underestimated in the past. No distinction is made in the book between farm income and the income to the farmer.

One of the solutions of the farm problem as stated by the author consists of "a wise policy for governing the uses to which land shall be put." This is not a new idea and, moreover, it is not as simple as it appears from the author's statement "Enough is known about soil, about the conditions necessary to profitable production, to make this easily practicable."

According to the author the chief solution of the farm problem lies in the reduction of costs. There is little or no hope of increasing prices by tariffs or

other schemes. "The Federal Farm Board will not do a great deal of harm and may do some good." Cooperative marketing offers some advantages which are often over stated. Costs can be reduced by more efficient farming, use of more fertilizer, changes in taxation, applied science and especially by corporation farming. The author's hopes for large scale corporation farms will at best be a slow development, and it can hardly be looked upon as a solution of the farm problems any more than chain store merchandise is a solution of the problems of the individual retailer.

The extension of non-food uses for farm-grown raw materials, especially from waste products, appears to the author as the most promising solution of the farm problem. He foresees increased incomes without increased prices of present salable products. In this connection he practically disregards the increase in costs connected with such uses and overlooks entirely that waste materials are joint products and that any gain derived from their use is as much of a stimulus to increased production as higher prices. Yet he recognizes fully that increased production means lower farm incomes.

The author is apparently better acquainted with agricultural literature than with economic principles. Sometimes he has been influenced by scientific articles, other times by propaganda. A few of the statements made indicate an understanding of the principle of comparative advantage, more often the reverse. In chapter V the supply price relationships are correctly stated. However, the same principles are lost sight of when interwoven with more complicated economic phenomena, especially joint products and costs. The use of cotton seed, a waste product, years ago did not materially or permanently increase farm incomes, but rather the supply of cotton with resulting lower prices. Future use of hulls, stems or other waste products will have similar effects. The benefit of science and research, on which the author pins great hopes for increasing farm incomes, will accrue more to the consumer than to the farmer. The boll weevil increased the farm income by destroying a large portion of the cotton crop. Scientific control of insects and diseases, increased production by use of more fertilizer and better farming will reduce costs and also prices, benefiting consumers with little net change in farm incomes.

In looking into the future the author has not considered the prospects of a stationary population. He takes little account of the vast amount of unused land, but stresses the possibilities of increased production by more scientific farming. He predicts that "ten per cent of America's population will be amply able to supply the nation's tables and lunch counters and perhaps still grow some surpluses to export." It is difficult to harmonize these concepts with the author's prediction that farm land values "will unquestionably rise again."

The revolution in farming is gradually reducing the necessary number of farmers. The title of the book is well chosen, "Too Many Farmers." The author's suggestions for improvement would make the condition still more true. As to relieving the hardships and suffering during the transition period, the author makes no suggestions, for according to his own words, "Adjustment to such developments is one of the inevitable problems of progress."

George M. Peterson

Washington, D.C.

Agriculture in the Chicago Region, by Edward A. Duddy. Chicago: University of Chicago Press, 1929. 158 pp. $4.00.

The study was undertaken as a part of the general program of community research in which the University of Chicago, the Chicago Commonwealth Club and the Chicago Regional Planning Commission are cooperating. The region studied includes three counties in Wisconsin, nine in Illinois, and three in Indiana, covering an area of 7,817 square miles. There is a short discussion of the trends of agriculture in this region, and a description of the six natural divisions of the area which have had an influence on agriculture. From the soil surveys of the three states an eightfold general classification of the soils was made. Short discussions of the drainage, climate, and land use complete this part, covering only thirty-one pages.

The second part consists of fifty-six dot and cross-hatched maps, and ten diagrams which present in graphic form the data on crops, livestock and livestock products, size and value of farms, land tenure and farm population. The figures are from the 1925 census, and are mapped by townships. The last part, covering fifty-five pages, presents the figures, by townships, upon which the maps are based.

The factors which determine the distribution of crops and livestock and which influence the size of farms, land tenure, etc., are presented in a short description below each map. One of the significant facts brought out by the study is the preponderance of agriculture as a land use in the Chicago region. Even when zones were drawn with Chicago as the center, at intervals of ten miles on the von Thünen plan, it was found that almost half of the land in the first zone (0-10 miles) was in farm land. In the next zone the percentage went up to 82 per cent, in the third zone to 87 and in the last to 89 per cent. The average for the entire region was 82 per cent. It would have been interesting had the author presented the other data in a similar manner, thereby isolating the influence of location or situs from the other factors. However, the detailed figures in the last part permit this additional refinement of the study.

G. S. Wehrwein

University of Wisconsin

NEWS NOTES

Mr. B. F. Alvord is now Associate Professor of Agricultural Economics at the Alabama Polytechnic Institute and is conducting courses in farm management, marketing, and agricultural economics. He will devote a portion of his time at Auburn to research in these fields.

Mr. P. F. Aylesworth has been appointed a half-time research assistant in the Department of Farm Management, Purdue University.

Mr. E. J. Bell, Jr., is acting in charge of the Grain Section of the Federal Farm Board. Mr. Bell is a graduate of the University of Montana, where he was for several years a member of the staff in agricultural economics, and has done graduate work at the University of Wisconsin.

Mr. C. D. Bohannan is with the Bureau of the Census, Department of Commerce with headquarters in Washington, D.C.

Mr. Marvin A. Brooker is on leave of absence from the Florida Experiment Station studying at Cornell University under a fellowship of the Social Science Research Council. He is making a study of the cost of transportation of Florida citrus fruits, with comparative costs from other states and foreign countries.

Mr. Carl M. Clark has been appointed a research assistant in Agricultural Economics at Alabama Polytechnic Institute. He received the Master's degree from Oklahoma Agricultural and Mechanical College last year.

Mr. R. W. Cox, formerly head of the work in agriculture at Teachers' College, Richmond, Kentucky, is an Assistant Professor in the Division of Farm Management and Agricultural Economics, University of Minnesota, teaching courses in marketing and in prices and doing research work in agricultural prices.

Mr. E. B. Doran completed work for the degree of Master of Science in Farm Organization and Management at the University of Illinois in August and has joined the Department of Farm Mechanics at the Louisiana State University.

Mr. F. F. Elliott, for several years a member of the Division of Farm Management and Costs, Bureau of Agricultural Economics, transferred to the Bureau of the Census on March 1, for special duty in connection with the Census of Agriculture.

Mr. L. M. Estabrook has been appointed Assistant to the Director of Scientific Work, United States Department of Agriculture. In December the Perma-

nent Committee of the International Institute of Agriculture at Rome unanimously elected Mr. Estabrook "Honorary Chief of Service" in recognition of his "most effective accomplishment of a special and delicate mission."

Dr. J. I. Falconer of the Rural Economics Department of Ohio State University, has been appointed by the Governor to serve on the Research Committee of the Governor's Committee on Taxation.

Professor H. C. Filley, Head of the Department of Rural Economics, University of Nebraska, spent the fall and winter quarters in graduate study at the University of Minnesota.

Mr. Z. L. Galloway, of the Department of Farm Economics, University of Kentucky, is at the University of Minnesota for graduate work this year.

Mr. Fred L. Garlock, for the last five years a member of the faculty of Iowa State College and of the staff of the Iowa Agricultural Experiment Station, on February 1 joined the staff of the Bureau of Agricultural Economics as Senior Agricultural Economist in the Division of Agricultural Finance. He will be engaged in studies in short-term finance and agricultural credit.

Mr. John C. Gilbert, Associate Marketing Specialist, Bureau of Agricultural Economics, died in Washington, D.C., on February 13, following an operation. Mr. Gilbert assisted in the inauguration and development of the Market News Service and since 1921 had been particularly interested in the development of the radio phases of that service. More recently he also took over much of the Bureau's work on exhibits.

Mr. W. J. Hart is now doing graduate work in the Department of Agricultural Economics, University of Wisconsin.

Mr. Perry V. Hemphill, a graduate fellow in the Department of Economics and Sociology, Colorado Agricultural College, is giving special attention to a study of farmer-owned and farmer-operated elevators in eastern Colorado, as part of a project dealing with the history and development of cooperative organizations in that State.

Mr. Clarence I. Hendrickson, since 1923 a professor at the Connecticut Agricultural College and last year acting Head of the Department of Agricultural Economics there, has recently been appointed Senior Agricultural Economist in the Division of Land Economics, Bureau of Agricultural Economics, with headquarters at Alexandria, Louisiana. He will be engaged in special land appraisal work undertaken by the Division in connection with the War Department's project for flood relief in the lower Mississippi River Valley.

Mr. R. H. Howard is now instructor in Agricultural Economics at the University of Florida.

Mr. G. S. Klemmedson is now Associate in Economics in the Department of Economics and Sociology, Colorado Agricultural College, engaged in studies of farm taxation.

Mr. W. J. Kuhrt resigned from the Federal Farm Board effective February 20, 1930, to accept the position of General Manager of the recently organized Northwest Grain Association. This is a regional association, a member of the Farmers' National Grain Corporation. Its membership is composed of farmers' elevators in the states of Montana, North Dakota, South Dakota, Minnesota, and Wisconsin. The association's headquarters are 600 Flour Exchange Bldg., Minneapolis, Minnesota.

Mr. A. H. Lindsay, formerly instructor in agricultural economics at Iowa State College, has been appointed Associate Professor of Agricultural Economics at the Massachusetts Agricultural College.

Dr. Theodore Macklin of the Department of Agricultural Economics of the University of Wisconsin, has been appointed a field representative of the Federal Farm Board, to be engaged in organization work. From December 1, 1929, until recently, Dr. Macklin has been in Florida with the Florida Citrus Exchange. He is now in California assisting in development of the marketing program for grapes and raisins.

Mr. E. J. McConnell, for the last two years an assistant in the Department of Farm Organization and Management, University of Illinois, has accepted a position as Assistant Farm Adviser with the Sangamon County Farm Bureau, effective April 1.

Mr. Elgin E. McLean has been appointed a Research Assistant in Agricultural Economics at Alabama Polytechnic Institute. He received the Master's degree at the University of Missouri last year.

Mr. W. G. Meal formerly a county agent and extension service worker in the State of New York, became connected with the Division of Cooperative Marketing, August 1, 1929, as an associate economist in the marketing of fruits and vegetables, working particularly with the associations marketing vegetables. Mr .Meal is a graduate of Cornell University where he has practically completed the requirements for the degree of Doctor of Philosophy.

Mr. W. P. Mortensen is teaching classes in marketing at Kansas State Agricultural College, Manhattan, Kansas.

Mr. Peter Nelson, a graduate of Utah Agricultural College, passed the preliminary examinations for the degree of Doctor of Philosophy at the University of Illinois in September, 1929, and accepted a position as Extension Specialist in Farm Management at Oklahoma A. & M. College.

Mr. K. J. Nicholson is teaching in the Farm Management Department, Purdue University.

Mr. Stuart Perry, a senior student in agriculture, has been appointed a student assistant in the Division of Farm Management and Agricultural Economics, University of Minnesota.

Mr. H. B. Pingrey, Assistant in Farm Organization and Management, Colorado Agricultural College, has been granted leave beginning January 1, 1930, and is continuing graduate work at the University of Minnesota. He expects to return in May.

Mr. Wesley W. Putnam, Agricultural Statistician for Wyoming, died suddenly on February 1 at Cheyenne. Mr. Putnam was one of the veterans in the crop estimating service.

Mr. G. H. Reuss completed work for the Master's degree at the University of Illinois in August, 1929, and has since been employed at the Louisiana State University.

Mr. S. E. Ronk is now an assistant instructor in the Farm Management Department, Purdue University.

Mr. George A. Sallee has returned to his position as instructor in the Division of Farm Management and Agricultural Economics, University of Minnesota, after a semester of graduate work at Cornell University.

Mr. Wm. A. Schoenfeld who was formerly northwestern representative of the Bureau of Agricultural Economics, was transferred, effective October 1, 1929, to the position of regional representative of the Federal Farm Board, in cooperation with the Bureau of Agricultural Economics. Mr. Schoenfeld's headquarters are still Portland, Oregon.

Mr. W. H. Schrampfer has been appointed instructor in Agricultural Economics at Iowa State College.

Mr. Ralph W. Sherman has been appointed assistant in the Rural Economics Department of the Ohio Agricultural Experiment Station. He will be engaged in research work in dairy marketing.

Mr. F. Van Smith has been a half-time research assistant in the Department of Farm Management, Purdue University, since July 1.

Mr. F. H. Turner is assisting Professors Hibbard and Commons in their studies of the tariff at Madison, Wisconsin.

Mr. L. L. Ullyot, a graduate of South Dakota State College, has been teaching courses in accounting since September, 1929, as instructor in the Division of Farm Management and Agricultural Economics, University of Minnesota.

Mr. Warren C. Waite, Senior Agricultural Economist, Bureau of Agricultural Economics during leave of absence from the University of Minnesota,

expects to return to his position as Professor in the Division of Farm Management and Agricultural Economics on July 1, 1930.

Mr. W. W. Wilcox, a graduate of Iowa State College of Agriculture with a Master of Science degree from the University of Illinois in Farm Organization and Management, has recently accepted a position with the Division of Farm Management and Costs, Bureau of Agricultural Economics.

Mr. N. E. Woodward has been granted a graduate fellowship in the Department of Economics and Sociology, Colorado State College of Agriculture, and is studying problems of taxation with special reference to the public school system in Colorado.

Mr. Leslie Wright, a recent graduate of the College of Agriculture, University of Illinois, specializing in Farm Management and Organization, has accepted a position with the Kentucky College of Agriculture at Lexington.

Recent transfers of personnel of the field force of the Division of Crop and Livestock Estimates, Bureau of Agricultural Economics, include the following:

Carl H. Robinson, Senior Agriculture Statistician, from Oklahoma City, Oklahoma, to Austin, Texas, to take charge of the work there. Associated with him are Mr. Frank E. Finley, Assistant Crop and Livestock Estimator, formerly at Las Cruces, New Mexico, who will handle the livestock work, and Mr. Francis H. Whitaker, Associate Crop and Livestock Estimator, formerly at Little Rock, Arkansas, who will handle the cotton work.

Mr. Kenneth D. Blood, Associate Crop and Livestock Estimator, from Austin, Texas, to Oklahoma City, Oklahoma, to succeed Mr. Robinson.

The Florida College of Agriculture and the Agricultural Experiment Station have begun a study of farmers' cooperative associations in Florida. Dr. C. V. Noble and Dr. H. G. Hamilton are in charge of the study.

An International Conference of Agricultural Economists was held at Dartington Hall, Totnes, Devon, England, last year. Another conference will be held this year at Cornell University, Ithaca, New York, August 18 to 29.

This conference is primarily of interest to those working in the field of agricultural economics, farm management, agricultural marketing, farm credit, farm taxation, agricultural prices, agricultural history, cooperation, and other allied subjects. Many persons from various countries throughout the world will be present and take part in the discussions.

The programs for the conference will be available about June 1, 1930, and may be obtained by writing to Professor Leland Spencer, Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, New York.

The 1930 session of the American Institute of Cooperation will be held at Ohio State University, at Columbus, Ohio. Credit courses will run from June 16 to July 23. The general sessions will run from July 7 to 12 inclusive.

The following have been added to the list of members of the Association since October, 1929:

ARNALDO, MARCELO V., College of Agriculture, University of Philippines, Los Banos, Laguna, P.I.

BAUMAN, R. H., Aetna Life Insurance Co., Defiance, Ohio.
BERRYMAN, CARL W., Burley, Idaho.
BEYRO, A. FERNANDEZ, Las Heras, 1974, Buenos Aires, Argentina.
BOHANNAN, C. D., 1301 G St., Silver Spring, Md.
BRAUNSCHWEIG, H. R. H. the Duke of, Villa Weinberg, Gmunden, Austria.

GRAFF, A. C., 234 Littleton St., West Lafayette, Ind.

HAUKE, ARTHUR M., Dep't of Rural Economics, University of Nebraska, Lincoln, Neb.
HILL, F. F., Dep't of Agricultural Economics and Farm Management, Cornell University, Ithaca, N.Y.
HOWARD, R. H., University of Florida, Gainesville, Fla.

KOHLMEYER, J. B., Dep't of Farm Management, Purdue University, West Lafayette, Ind.

LUBIAKO, PROF. B. N., Timiriazeff Agricultural Academy Farm, Ap't 6, Moscow 8, U.S.S.R.

MALLORY, L. D., 328 Hilgard Hall, University of California, Berkeley, Calif.
MANHART, V. C., Dep't of Dairy Husbandry, Purdue University, West Lafayette, Ind.
MAYER, I. D., 520 Hays St., West Lafayette, Ind.
MERCHANT, FRANK H., 1 Duesenbury Pl., White Plains, N.Y.
MIDDAUGH, W. S., Dep't of Agricultural Economics and Farm Management, Cornell University, Ithaca, N.Y.
MOORE, ARTHUR N., 6 Buckingham Pl., Cambridge, Mass.

NUCKOLLS, W. J., JR., Blacksburg, Va.

PANCNER, F., 3505 West 26th St., Chicago, Ill.
PAVLOFF, DR. J., Institute of Foreign Trade, Tverskaya 56, Moscow, U.S.S.R.
PERRY, STUART, Division of Farm Management and Agricultural Economics, University Farm, St. Paul, Minn.

REUSS, L. A., 206 West Nevada St., Urbana, Ill.
RONK, S. E., Farm Management Dep't, Purdue University, West Lafayette, Ind.

SECOR, ALSON, Successful Farming, Des Moines, Iowa.

SIBLEY, HARPER, 100 Hiram Sibley Bldg., Rochester, N.Y.
STONEBOROUGH, T. H., 544 Cathedral Parkway, New York, N.Y.

TURNER, F. H., 609 West Johnson St., Madison, Wis.

UJANSKY, PROF. S. G., Kositzky I.A. Kv 37, Moscow, U.S.S.R.
UNDERWOOD, F. L., Dep't of Agricultural Economics and Farm Management, Cornell University, Ithaca, N.Y.

VANSMITH, F., Farm Management Department, Purdue University, West Lafayette, Ind.

WESTBROOK, N. E., School of Agriculture, Purdue University, West Lafayette, Ind.

YAGI, PROF. YOSHINOSUKE, Dep't of Political Economy, Kyoto Imperial University, Kyoto, Japan.
YOUNGBLOOD, B., 3103-17th St. N.W., Washington, D.C.

LIBRARY, Indiana University, Bloomington, Ind.
LIBRARY, University of Maine, Orono, Me.
LIBRARY, University of Tulsa, Tulsa, Okla.
LIBRARY, Federal Reserve Board, Treasury Bldg., Washington, D.C.
SCHOOL OF AGRICULTURE, University of Cambridge, Cambridge, England.
INSTITUT FÜR LANDWIRTSCHAFTLICHE MARKFORSCHUNG DER LANDWIRTSCHAFTLICHE HOCHSCHULE, Invalidenstrasse 42, Berlin, Germany.
DEPARTMENT OF ECONOMICS, Kyoto Imperial University, Kyoto, Japan.
HIKONE COMMERCIAL COLLEGE, Hikone-machi, Shiga-ken, Japan.
"NORIN," Care of Maruzen Co., Ltd., Tokyo, Japan.
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MITCHELL'S BOOKSTORE, 576 Cangallo, Buenos Aires, Argentina.

The Secretary reports the following changes of address of members (new address only given here):

ALVORD, B. F., Alabama Polytechnic Institute, Auburn, Ala.
APP, Frank, RFD No. 5, Bridgeton, N. J.
BELL, E. J., Jr., 2145 C St. N. W., Washington D. C.
BENEDICT, M. R., Room W., Widener Library, Harvard University, Cambridge, Mass.
BOOTH, J. F., Commissioner of Agriculture, Department of Agriculture, Ottawa, Ont.
BREDIN, J. H., 1940 Sherman Ave., Evanston, Ill.

BUCK, J. LOSSING, University of Nanking, Nanking, China.
BUECHEL, F. A., Bureau of Business Research, University of Texas, Austin, Tex.
CHEN, C. T., Forest Home, Ithaca, N.Y.
DAVIS, J. S., 1522-31 St. N.W., Washington, D.C.
DAWSON, O. L., Bureau of Agricultural Economics, U. S. Dep't of Agriculture, Berlin, Germany.
DORAN, E. B., Department of Farm Mechanics, Louisiana State University, Baton Rouge, La.
DUMOND, C. A., Care of Union Free High School, Arkansaw, Wis.
EKE, PAUL A., Department of Agricultural Economics, University of Idaho, Moscow, Idaho.
ELLIS, L. S., 1551 Jefferson St., Madison, Wis.
FARRINGTON, CARL C., Bureau of Agricultural Economics, Washington, D.C.
GORDON, JOHN B., 1251 National Press Bldg., Washington, D.C.
GRINNELL, H. C., 134 Linden Ave., Ithaca, N.Y.
HART, W. J., 333 North Randall Ave., Madison, Wis.
HARTMAN, S. C., 158 Morris Ave., Athens, Ohio.
HOBSON, ASHER, Bureau of Agricultural Economics, Washington, D.C.
HOLMES, M. L., Care of G. L. F. Exchange, Inc., Ithaca, N.Y.
HORMING, T. G., Roca, Neb.
HOWELL, L. D., 1808 Kenyon St. N.W., Washington, D.C.
KUHRT, W. J., Federal Farm Board, Washington, D.C.
LINDSEY, A. H., Massachusetts Agricultural College, Amherst, Mass.
MEAL, WM. G., Federal Farm Board, Washington, D.C.
MORI, SHIRO, Care of Hyogo-ken-Nomuka, Kobe, Japan.
MORTENSEN, W. P., Kansas State Agricultural College, Manhattan, Kan.
MUMFORD, D. C., 1900 F St. N.W., Washington, D.C.
MURRAY, KEITH A. H., Department of Agricultural Economics, Oxford University, Oxford, England.
MCNAIR, A. D., 2605 Adams Mill Rd., Washington, D.C.
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OSTROLENK, BERNARD, New York *Times* Analyst, Times Square, New York, N.Y.
PECK, MILLARD, Iowa State College, Ames, Iowa.
PETERSON, GUY A., 807 Quackenbos St. N.W., Washington, D.C.
PICKARD, CLARENCE, 1206 South First St., Aberdeen, S.D.
ROBOTKA, FRANK, 5514 Blackstone Ave., Chicago, Ill.
ROSS, H. A., The Borden Company, 350 Madison Ave., New York, N.Y.
SHEPARD, JOHN B., 500 Cumberland Ave., Chevy Chase, Md.
SILBERLING BUSINESS SERVICE, 770 Santa Barbara Rd., Berkeley, Calif.
SURFACE, FRANK M., P.O. Box 2638, Stanford University, Calif.
WALRATH, F. J., Polytechnic Institute, Cookeville, Tenn.
WEAVER, F. P., Department of Agricultural Economics and Farm Management, Cornell University, Ithaca, N.Y.
WILLIAMS, CARL, 3601 Connecticut Ave., Washington, D.C.
HAMILTON-SMITH LIBRARY, University of New Hampshire, Durham, N.H. (instead of New Hampshire College Library).

BUREAU OF STATISTICS, H. B. Weiss, Room 903 Trenton Trust Bldg., Trenton, N.J. (instead of New Jersey State Department of Agriculture Library).

REFERENCE LIBRARY, Guaranty Company of New York, 31 Nassau St., New York, N.Y. (instead of National Bank of Commerce).

HAMBURGISCHES WELWIRTSCHAFTS-ARCHIV, Poststrasse 19, Hamburg, 36, Germany (instead of Director Stuhlman).

THE UTSUNOMIYA KOTO NORIN-GAKKO, Toshokan, Tochigi-ken, Japan (instead of the Uchiyama Book Store, Utsunomiya, Japan).

NATIONAL LIBRARY, Legislative Reference Division, Manila, P.I. (instead of Philippine Library and Museum).